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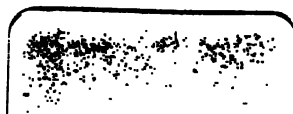
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THE LIVE-STOCK OF THE FARM.

BY

W. T. CARRINGTON, G. GILBERT, J. C. MORTON,
GILBERT MURRAY, SANDERS SPENCER,

AND

J. WORTLEY-AXE.



LONDON:

BRADBURY, AGNEW, & CO., 9, BOUVERIE STREET.

1882.

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THE present Volume is the second of a *series of five**—the others discussing the Chemistry and the Crops of the Farm, the Soil and its Tillage, and the Equipment of the Farm and the Estate. Each book will be complete in itself, and the whole will form a *Handbook of the Farm* adapted to the wants of the teacher and the student of agriculture. The remaining volumes of the series will appear as they are ready. Among the writers who are and have been engaged on them are R. WARINGTON, W. T. CARRINGTON, G. MURRAY, T. BOWICK, G. GILBERT, S. SPENCER, W. BURNES, J. C. MORTON, and others.

J. C. M.

* It is probable that, in order to the completeness of the scheme, so far as the Principles of Agriculture are concerned, a sixth volume may be added relating to the Processes and Conditions of Animal and Vegetable Life.

PREFACE.

THE several chapters of this Handbook had been undertaken by Mr. W. T. Carrington, writing on Cattle, the Dairy, and the Sheep—Mr. Gilbert Murray on the Horse—and Mr. Sanders Spencer on the Pig stock of the Farm. The lamented death of Mr. Carrington before the preparations for the work had been quite completed, made it necessary somewhat to supplement the original arrangement. The section on the Shorthorn accordingly has been written by the Rev. George Gilbert; and that on the Hereford, has been contributed mainly by Mr. J. Hill, of Felhampton Court, Church Stretton. For the paragraph on the Devon we are indebted to the

Rev. W. J. Pope, of Godmanstone, Dorchester. The Chapter on the Dairy has been largely added to by Mr. J. C. Morton; that on Poultry has been written by the Rev. G. Gilbert; and for the concluding chapter on Health and Age the reader is indebted to Professor J. Wortley-Axe, of the Royal Veterinary College.

J. C. M.

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THE

LIVE-STOCK OF THE FARM.

CHAPTER I.

BREEDS AND MANAGEMENT OF CATTLE.

The Shorthorn Breed: Description—History—Herd Book—Extension—Improvement of other Breeds—Milk and Meat Producing Capabilities—Portraits. *The Hereford Breed*: History and Description—Meat Producing Capabilities—Portraits—General Management. *Devon and Sussex Breeds*: Resemblance—Dairy Fitness—Early Maturity. *Polled Angus Breed*: Characteristics—Performances. *Dairy Breeds*: Longhorns—Welsh—Ayrshire—Norfolk Polled—Channel Islanders—Meat-producing and Dairy Cattle. *General Management*: Breeding—Calf Feeding—Young Beef—Grazing.

THE latest agricultural returns show that the total number of cattle of all ages, in Great Britain, is about six millions. This number is made up, in very unequal proportions, of nearly a dozen distinct breeds and of crosses between them. These breeds differ so widely in appearance, and in points of merit, that it seems hard to believe that they can all have originated within the narrow space of this island. Yet they all seem to have done so! And this fact bears witness to the great variety of our soil and climate, and to the power which can be exercised by man over animal life by continuous selections of breeding animals in herds and flocks, through long periods, for some special

properties. In naming here the leading breeds, in their turn, some of the distinguishing characteristics of each will be mentioned in detail.

1. The Shorthorn Breed.—Foremost among varieties of our cattle must be placed a parti-coloured race, once spoken of as Teeswater or Durham, but now almost universally called Shorthorns. It varies in colour from dense red to pure white: and is found in all combinations of these two colours. Its skin may be all red, or all white, or red and white in separate patches, or the colours may be blended together as roan, which itself may either cover the whole body, or be distributed in markings on a white ground. In some districts—notably in Lincolnshire—a whole red is still preferred; and large herds of Shorthorns may be seen there, which are all red and the animal red all over. Although many of the best Shorthorns have been white, this colour is not commonly liked: and an endeavour is generally made to get away from white, and to produce roan by coupling any white parent with another of richer hue. Any appearance of black or grey is held to indicate impurity of blood; yet it is certain that black noses do occasionally occur even in herds of very fashionable breeding: whilst black tipped horns are a not uncommon blemish. But the breeders of Shorthorns are less bound by restrictions of colour than are those of any other variety. Form and handling—that is, the feel of the flesh in the hand as it is gripped or pressed on rib or back—and the propensity to fatten early and to produce a large supply of milk and meat, have always been held to be of more importance than uniformity of markings or of hue; and this freedom

from artificial restrictions may perhaps have helped to bring about the general usefulness of the breed. It is this general usefulness which entitles the Shorthorn to be noticed first. Its large number (probably equalling those of all the other breeds put together) is only one consequence of the wide recognition of this usefulness. The Shorthorn has extended itself further from its native pastures than any other breed. Large herds of it now exist in almost every county in the Island, however good the original local varieties may be ; and the exportation of Shorthorns—not only to the Continent, but to America and Australia—has been, and continues to be, very much larger than that which any other variety has obtained.

The date since which the Shorthorn has had a distinct existence has been disputed. The foundations of the breed were, assuredly, laid many years before it obtained any universal popularity. It certainly existed in the valley of the Tees quite in the early years of last century, if not before ; and visitors to Durham and Yorkshire, as far back as 1700, brought back wonderful stories of the size, weight, and yields of milk, obtained from Teeswater cattle. The variety is believed to have been produced by crossing a very large white breed (of whose origin there is no very definite account, but which still lingers in places) with some local cattle which the rich pastures, enjoyed through many generations, along the banks of the Tees, had caused to become unusually fine. And this very excellence, and the notice it attracted from strangers probably caused the cattle-owners of the Teeswater district to be alive, sooner than was the case with breeders in other counties, to the importance of mating only good specimens together, and of excluding inferior animals. Any-

how, when, in the earlier years of the present century, men, who had become interested in the Teeswaters, were anxious to establish a Herd Book, it was found that private registers, extending over more than a hundred years, existed already in several families, distinguished for possessing fine cattle. But the names of these improvers are now but little recognised. As is commonly the case, the real originators of a successful novelty of any kind are quite unknown even in the early days of its public success. And the names of the men, who were actually in possession of fine specimens of Teeswater cattle when public attention was drawn to the variety, have overlaid and hidden the names of their predecessors by whom the progenitors of those fine specimens had been bred.

In this way, the names of the two brothers Robert and Charles Colling have now become associated with the reputation of the Shorthorn to the entire exclusion of older breeders. Between 1800 and 1818, the large prices made by these men (who seem to have dealt largely in breeding animals of this variety) attracted general notice. They had bought up, whenever they could get them, the finest cattle of the Teeswater district: selecting the best of their purchases to keep for themselves, and passing on the less meritorious ones to their customers. Robert Colling had long been a sheep-breeder, and had had for years an annual sale, or letting, of tups, and persons coming for these saw, and became interested, in the cattle as well. An ox and a heifer, bred by the Messrs. Colling, and sent to travel from fair to fair throughout the United Kingdom, made their names, and that of the cattle, familiar to everybody. Then came the newspaper paragraphs of the wonderful averages made at their sales; and when, in 1820, a committee was

appointed to obtain pedigrees, with a view to establish a Herd Book, the committee accepted a connection with Messrs, Collings' herd as being sufficient to establish the position of any candidate for registration; and comparatively few pedigrees got inserted in the first volume which do not trace to a cow bred by one of the Messrs. Colling, or to an animal bought from them. Their names are thus part and parcel of the pedigrees of the entire breed.

Yet it must not be assumed, from these remarks, that it is believed that the credit assigned to these breeders, although probably in excess of what they did, has been at all unworthily bestowed. If the Messrs. Colling profited by the labours of other men, they carried on and confirmed the work of other men as only thorough workmen can. If they did not originate the Shorthorn, by common consent they greatly modified and improved it. They found a huge, rather ungainly, animal, capable of producing great weights of beef and large yields of milk; yet with the flesh unequally distributed upon a somewhat rough carcase. The original Teeswater was probably a very large consumer, with much offal. By choosing the neater and more symmetrical specimens, and by carefully inbreeding these, Messrs. Colling established a neater type than had hitherto existed, and one capable of being turned out fat at an earlier age. They made the variety more uniform in appearance and more pleasing to the eye, without having sacrificed any of its valuable properties. By so doing, they extended its reputation; and, with this, its value; and they made its merits visible to hundreds who, without some assistance from their skill as breeders and men of business, would have remained all their lives ignorant of there being any breed in exist-

ence superior to their own cattle. It would be unwise to detract from the services rendered by the Messrs. Colling; although modern research completely upsets the popular tradition that they founded the Shorthorn. The name of Shorthorn seems to have been something of an accident, but it established itself everywhere through the distinction seen to exist between the new Teeswater and an older variety previously made fashionable by Mr. Bakewell, *i.e.*, by comparison with an earlier favourite, now called the Longhorn. It might be thought that the length of horn was a matter of small importance; yet experience has shown that the increased necessity for housing cattle, and keeping them within narrow space, and, even more than this, the now universal practice of forwarding cattle to market by train, has rendered very long horns a serious objection to any breed. The smaller horn of the Teeswater has been found convenient, whilst the placid temper of the majority of the breed is another recommendation. The more artificial the condition of the country becomes, the more likely the Shorthorn is to increase. It is by no means fastidious either about climate, soil, or lodging. It can with good management be made to thrive anywhere: the sheds of town-milk men are not too confined; nor are the Cumberland valleys too steep or too wet; nor the extreme north too cold.

It cannot be questioned that in 1822 (when the first volume of the "Shorthorn Herd Book," with Mr. G. Coates' name as Editor, appeared) the Teeswater had comparatively a small number of supporters, and that these were, mainly, to be found in one or two English counties. That volume contained the results of nearly half a century

of selections; yet it did not contain quite 800 bulls, and hardly so many females; and the volume was not followed by a second until 1829; and, for some years after that, the publication languished, and it seemed doubtful if the experiment of registering cattle would ever take firm root. Yet there is now published annually, by a committee of the Shorthorn Society of not far from 1000 members, a volume of at least three times the size of the first; and its contributors are resident in all quarters of the world. Whilst France and Ireland, America and Australia, have long had herd books of their own, the number of registered bulls in England already approaches 45,000: and one American herd book alone, which increases at a more rapid rate than our own, exceeded, in its last issue, the limit of 41,000 bulls. When we consider that these numbers do not approximate to the total of even pure-bred Shorthorns—for the evidence of the Herd Books themselves shows that hundreds of animals, whose births are duly recorded, pass yearly into the hands of men who breed from them yet do not register the produce—the fertility of the race is very remarkable. The whole of the breed, within a century, was confined to a small district. There is now hardly any part of the world, in which Englishmen have found homes, into which the Shorthorn has not penetrated.

It is impossible to suppose that this universal acceptance of the Shorthorn—over so long a period, and over such an enormous range of territory—is the result of any accident. Nothing can explain the steady, unchecked advance of the breed, but the acknowledgment that no other variety has yet been generally ascertained to be so serviceable. The town and country dairyman, and the grazier of dry herds

in the remotest pastoral districts, accept readily the pretensions of a breed which is always useful and always saleable. When in milk, the cows give a very large flow, and for a long period ; and when dry they rapidly clothe their frames with beef, which, if not of the first-class, is always fit for consumption, and such as is in demand in any market. Nor do the good qualities of the Shorthorn end here. One of the most remarkable qualities of the race is its ability to accommodate itself to circumstances ; and to cross, to their great benefit, any inferior breeds. Originating in very fine grass land, it has long been bred successfully on moors and wolds, in bush and prairie ; and, whilst able to maintain itself in freedom, it submits without deterioration to any amount of house feeding. It, moreover, has been found that the coarsest of the "scrub" cattle in America, and the best and worst of home-breeds, accept as an improvement a cross with the Shorthorn. The alliance, without impairing the good points that other breeds may have had, is almost always found to lend some new merit to the progeny.

As evidence of the material advantages to be gained by crossing native breeds with this variety, it has been said that, since the introduction into Aberdeenshire of the Shorthorn, the annual draft of cattle of that county goes out fat a year sooner than it did before. The Teeswater found its way over to Ireland, and more than half of the Irish cattle are now equal to the best Durham breed. Shorthorns have been, since 1817, freely exported over the Atlantic ; and thus, ninety-nine hundredths of the fine American oxen, which have been recently introduced into English markets, have inherited so much Shorthorn blood as to look like good English Shorthorns. This is a history

to which no other variety that ever existed can show the like. The reputation of the Teeswater is so long established, so wide, and has been tested in so many different ways, that a breed, which owns it, needs no other recommendation to public notice than a mere narrative of facts. Yet the Short-horn has one other curious inheritance. Of late years a very great deal has been heard and read of the enormous prices for which favoured specimens of this variety have been sold. The inferences are many, of which a large proportion are mere guesses; but the incident is a fact. It cannot be explained away. It may be said that mere price, in a rich country, is a very inconclusive test of merit. This is true; yet selling-price is a test by no means without its value. When in 1810, Charles Colling sold his bull Comet for a thousand guineas, the story proved a convenient form of advertising the whole breed which has hardly yet ceased to operate. And of late years above four times the sum paid for Comet has been paid in England for both bulls and cows; whilst, in America, far larger prices, even than these, have been repeatedly offered and taken. There has sprung up, within the last few years, a demand in England for the best specimens bred in America; and in America for the best specimens bred in England. This desire for exchange foretells a trade at rates even higher than any yet realised. The question is not now, "What will the richest breeder in England give for a coveted specimen of a favourite tribe?" but, "To what limit will the emulation of the wealthiest cattle-owners of the two wealthiest nations, which ever have existed, carry them when the object is to become possessed of what is mutually agreed to be the pick of the market?" How far this artificial demand will run no one can foresee;

yet that it has existed since the century began, and continues to make itself felt to an increasing extent, is a fact in connection with the Shorthorn breed, which is as much part of its history as is its early connection with the Tees, its parti-coloured coat and its shortened horns.

This part of the history of the Shorthorn has intentionally been kept apart from the ordinary account of it; because, admitting the statement to be true, it does not seem to be the Shorthorn's best claim to notice. As was said at the outset it is its general usefulness, which is its strongest recommendation. The better specimens of this breed rarely come into any public market. They are sold, either by private contract, or at public auction, advertised to take place on the breeder's premises; and many wealthy owners have such sales periodically; where the brotherhood of the pursuit are invited and liberally entertained. At Yarm Fair and Darlington markets, good average specimens, without much certainty of their pedigree, are regularly on sale. At Bingley Hall (Birmingham), at the Royal Dublin Show, and at some of the Scotch spring and autumn sales, large numbers of young bulls, of the very best strains, are offered every year by their breeders, who take great pains to compete for the prizes offered; although the main object of these gatherings, is to obtain customers for the supernumerary bulls. The traffic in pedigree Shorthorns is a business of no small importance. In the number of a circular—issued quarterly by Mr. Thornton, the prominent auctioneer of pedigree cattle—which appeared in the spring of 1876, it was stated that,—without taking into account any private transactions, of which there are very many every season,—the total sum paid, at Shorthorn sales, during

the previous year, amounted to not far from a quarter of a million of money. Yet this was but a very small part of the annual results of the contribution to the national prosperity which has been effected by this remarkable variety of cattle. Its real triumph is to be estimated when one notices the extraordinary extent to which the type established by the Messrs. Colling has encroached upon every other. In all the dairy counties in England, even in the west and southern counties, a very large majority of the cattle visible are virtually Shorthorns. This too is the case with more than half the cattle sent for sale to the fairs and markets for winter-grazing beasts. Even the pastures of Normandy, and of many other French departments, show the same stamp of cattle. And, in the United States and Canada, no less than Australia, the demand for Shorthorn bulls—to use for crossing inferior races in order to furnish cattle for exportation back to this country—exceeds the supply; although the number, produced in these countries yearly, is in excess of the numbers which are reared in England.

It is proper to give, here, some of the records of large produce from Shorthorn cattle. Instances are chosen which have been handed down upon sufficient evidence. Mr. Lakin (of Powyke, Worcestershire, who died about 1848), is stated to have been an exceedingly careful observer, and a man recognised as an authority among his neighbours. He reported that, after many trials, he could find no cattle so profitable, as milkers, as the pedigree Shorthorns. He published a return of the yield of milk in his dairy, taken over many years. From this, it appeared that a cow, called Strawberry (which lived to be twenty-seven years old, and is registered in the "Herd

Book ") gave an average of 1050 gallons a year for fifteen consecutive years; and that another prime Shorthorn cow, named Novice, yielded 1040 gallons a year for five years. A cow, called Barforth, is reported by Mr. Whitaker of Burley (to whose exertions, and influence among breeders, the origin of the Herd Book, edited by



HEAD OF SHORTHORN BULL.

Mr. Coates, is mainly due) to have yielded 36 gallons of milk per day for two successive weeks; from which was produced 16 lbs. of butter (of 24 ounces to the pound) within the week.

This instance could hardly have been within Mr. Whitaker's own knowledge;

for the cow Barforth's descendants, in the second and third generation, are entered in the Herd Book as having been born prior to 1780. But possibly he may have known the following. Chiltona (a cow the property of and bred by Mr. C. Mason, of Chilton, one of his Portia tribe), is reported to have given 263 ounces of butter within the week; and one of Mr. Bates' Duchess tribe is said to have given 294 ounces within the same time; whilst a cow, of Mr. T. Booth's Christon tribe, is "credibly

affirmed to have given four average pailfuls of milk, within the day." Of course, all these are exceptional cases; yet it should be said that instances of pure Shorthorn cows giving 6 to 7 gallons of milk in the day are by no means uncommon; nor are cases of animals which yield a large daily flow, from the time of one calving to the next without ever being dry, by any means rare. Mr. E. C. Tisdall, of the Holland Park Dairy, Kensington, who has long cultivated a Shorthorn dairy herd, reports, among the records of many years' experience, an average of 885 gallons apiece yielded by twenty-five cows of this breed during the ten or eleven months of the year when they were in milk. And ten selected cows had yielded as much as over 1200 gallons apiece in the same time. The yield of



HEAD OF SHORTHORN COW.

butter by the Shorthorn has been exceeded by that of other breeds; but the returns of milk and butter together have not. Nor are the returns in beef less remarkable. Mr. Whitaker speaks of a barren heifer which at four years old fetched £65 from a butcher. Mr. Hutchinson reports that the four quarters of a twin-heifer, slaughtered on the day she became three years old, weighed 70 stones of 14 lb. to the stone; that an ox, three years old, weighed, off the pasture, "without cover or cape," 95 stones; and

that a bull, in his fifth year, which was "put up to feed" for four months only, weighed 122 stones, with 12 stones of loose fat. These instances, taken without preference from a few of the most noted breeders, show the standard attained, in the early years of this century. There has certainly not been any falling off since. Hundreds of steers are turned out yearly, weighing from 60 to 70 stones of 14 lbs. before they are 24 months old; whilst very many are sold ripe-fat at remunerative rates six to eight months younger than this. The Shorthorn variety far exceeds every other, in the weights attained by its females. There are several well-authenticated instances of cows which have yielded above 90 stones of carcase. It is a curious fact that, in no instances does the value of the Shorthorn blood—in producing early maturity—show itself so much as in the Cross-breeds produced from it. These, especially from cows of the larger varieties of polled cattle, have a greater weight recorded than even the offspring of pure-bred cows. Of course the figures here given of the yield, whether of meat or milk, are far beyond the ordinary experience. What the average experience is will be referred to hereafter.

It is not possible to give in these small pages any engraving which should do justice to the massive frame of a well-bred Shorthorn, well covered, as it is when fat, over rib and loin and round, where the meat is of the best quality. We must be satisfied with portraits of the head of bull and cow. The heads selected are those of the "Duke of Wetherby 5th," bred by Colonel Gunter, and long used in the Holker herd—and Mr. Holford's "Baroness Oxford 3rd,"—both of them fairly characteristic of the breed in one of its best families.

2. **The Hereford breed** of cattle is famous for producing beef of fine quality and for its hardiness, the cattle of this breed lying unsheltered in the fields through most of the year, but it is not noteworthy for its dairy merits. Although the Herefords are in general of smaller size than the Shorthorns, they will, when well fed from birth, attain quite as great a weight at an early age. Herefords are very generally bred in the county from which they take their name, in Shropshire, and in some parts of Wales; a few herds are also kept in adjoining counties. Probably in no county in England is the average merit of the cattle so high as in Herefordshire. Large numbers of the bullocks and draft cows and heifers are bought for feeding in other parts of England. Hereford October fair has for the last 100 years been one of the best displays of cattle for sale in England. The great numbers exhibited for sale, the general excellence of the cattle, and their uniform red colour with white face, "the red line tipped with white," combine to make this fair most interesting to all lovers of good cattle.

Although the "Hereford Herd Book" was first published only in 1845, these cattle have been most carefully bred for more than 100 years. Fashion has not however, with this breed, as with the Shorthorn, attached a value, in some measure artificial, to special families, apart from individual merit; and, to the fact that breeders have not been hampered by the claims of fashion, may be attributed much of the uniformity and general excellence of the breed. The almost universal colour of pure-bred cattle is red, with white face, mane and throat. A few light grey and mottle-faced animals are, however, still found. The beef of Hereford cattle is peculiarly tender

and fine-grained ; but the cattle are often a little deficient in the quantity of internal fat, and are thus not what are called good butchers' beasts.

Herefords have been exported, and are now bred in America and Australia. They are found specially suited for crossing with the native cattle which graze on the prairies of the Western States of America, and an active export demand has sprung up for young bulls of this breed. Hereford cows generally suckle their own calves, which get all their milk for six months, thus obtaining an excellent start in growth, the benefit of which continues. The uniform excellence of cattle of this breed is due somewhat to the advantage of this good rearing.

The chief points to be looked for in a good Hereford are, first, that the colour should be a distinct red, not too dark or too light ; white face and mane, also white breast and belly—end to tail—and white legs as far as the knee and hock, sometimes running up the flank. The bull should have a good masculine head, not too long, broad between the eyes, which latter should be large and prominent, with a mild look, denoting docility of temper ; the horn should be of moderate length, springing straight from the head. The cow's head should be much the same, but finer, and her horns should have a mane and turn upwards slightly ; they should be in both cases of a waxy white, although they are occasionally found tipped with black ; the nose should be a pure white or flesh colour. The bull should have a good rise of crest, deep sloping shoulders, well-developed brisket, straight back and belly line, wide loin, good springing ribs, moderately broad hips, tail well set on and falling in a plumb line to the hocks. The hind-quarters should be long from the hip backwards ; the

thighs, which are a very important point, should be large and full, showing plenty of width across when you stand behind, and they should be well meated to the hocks ; the whole carcase should be set square on good short legs standing well apart, and be covered with firm flesh of good quality, and a mellow hide of soft but not too fine hair, giving the impression when you touch it that it will stretch to any extent. The test of 'touch' is, however, extremely difficult to describe, and can only be learnt by practice.

Hereford cattle are a distinct and pure breed of great antiquity. Their early history is uncertain ; but it is generally allowed that there has been a breed of cattle red and mostly with white face and markings for at least 200 years in the county of Hereford and the neighbouring counties. It is asserted that Lord Scudamore, who died in 1671, introduced cows of the red with white face breed from Flanders. There was also a breed of cattle known in Herefordshire that were 'white with red ears,' and so far back as the tenth century it is recorded that there was a law of fixed compensation to be paid for injury done by one prince to another at 100 white cows with red ears and a bull of the same colour. And it may be fairly considered to be proved that the Herefords of to-day have sprung directly from the old breeds of the district, the old grey Hereford coming from the white cattle with red ears, an occasional white Hereford cropping up as an additional proof of this.

There used to be three distinct kinds of Herefords : the mottle-faced, the grey, and the red with white faces. The first-mentioned were usually the largest, but with great quality and good touch ; the grey were good feeders,

and of a medium size; while the red with white face usually were the smaller cattle, finer in the bone, and altogether more taking to the eye; and these by degrees excluded the others, and now reign triumphant.

There is rather a prejudice against cattle of the light red colour; although the light red, as a rule, are of a better quality and feed quicker than the dark red ones. The late Lord Berwick's cattle were usually of this light red colour, and they were always, as their descendants now are, celebrated for their quality and aptitude to lay on flesh. The early records of the breed show that they were carefully bred in 1766 by Mr. Tomkins and others. At the first meeting of the Smithfield Club, in 1799, the 1st prize was won with a Hereford ox by Mr. Westcar. and this gentleman took the 1st prize with an ox of this breed for twenty years in succession at the London cattle show, which was open to all breeds. The Herefords of that period were of great size, and usually kept for working on the land and fed off afterwards. The Smithfield record shows that from the year 1799 to 1834, Hereford bullocks had taken eighty-eight premiums at the London fat stock show, more than double the number of any other breed of cattle in the same period. The sales of Mr. Westcar's oxen are worthy of note. In the course of eleven years he sold twenty oxen for £2123, averaging £106 6s. each. The early recorded sales show that they were most highly esteemed. In 1819, fifty-two head of Mr. Tomkins' cattle made £4673 14s.; twenty-three of them were steers; the breeding stock averaged £145. Again, in 1816, a herd of 116 head of Mr. Price's cattle made £6724 4s. 6d., which brought an average of £57 19s. 4d. This includes twenty-seven yearling heifers and twenty-one 2-year-olds.

One of the first who set to work to improve the Hereford type, and get them to mature earlier, was the late Mr. Knight, of Downton Castle. The Downton herd sprang from three of the best herds of that day—Mr. Tully's, Mr. Tomkins', and Mr. Skryme's. The last-named was characterised by the light red colour mentioned before as being usually the colour of Lord Berwick's tribe of cattle, which is descended in a distinct line from the Knight herd. The darker colour and signs of the old tick face come from the Tomkins blood, as his cattle were usually mottle-faced; and the Tully cross gave the greys for which Downton was so celebrated.

Such is an outline of Hereford history from the latter half of the last century up to about 1844. Most of the Hereford breeders of the present day follow the type set by Lord Berwick and Mr. Knight, and endeavour to get their cattle deep bodied, heavy fleshed, on short legs, and small bone.

The Herefords are considered eminently qualified for crossing purposes for beef making, and although dairying is not the practice of the county, Hereford dairy herds are not unknown; and at the Agricultural College in Ontario, a cross of the Hereford bull, on a common cow, gave the best practical result of all breeds for the production of butter. For dairy purposes a cow should be milked regularly and stripped quite clean, and no doubt this has much to do in forming good milking tribes of cattle. Where calves are allowed to suck in the open field, as is the practice in Hereford, this cannot be attended to, and is one great cause of the Herefords not giving so much milk as they would under other circumstances.

As beef-makers they are quite at the top of the

market, as market quotations record best Scots and Herefords as being usually quoted together. And for quantity as well as quality of meat they are not excelled. The capability of the breed as quick feeders and economical producers of meat is unquestionable. The records of the Smithfield Club in any year may be quoted for this pur-



HEAD OF HEREFORD BULL.

pose. We have those of 1879 before us; and we find that six Hereford steers exhibited at the Agricultural Hall that year, averaging 2 years 4 months old, weighed alive 14 cwt. 2 qrs. 4 lbs. apiece; and that seven, averaging 3 years and 8 months old, weighed 17 cwt. 2 qrs. 4 lbs. each, thus making (supposing them to have been the same weight as the others at the younger age) 56 lbs. of live weight monthly during the year, which under the circumstances must have been almost wholly profitable flesh. Ten shillings a week increase of value as the result of

liberal treatment of a well-bred ox is not unknown in other breeds, but it is remarkable, when true, of a two-year-old.

Breeders of Herefords claim for their favourites that they are among the most hardy of all breeds of cattle, and thus are particularly adapted for countries where it is impossible to take special care of cattle through the winter. Evidence from America shows that they stand the rough usage they get there better than any other cattle that have yet been tried.*

The two illustrative portraits represent respectively Mr. A. Rogers' Hereford bull, "Thoughtful," and Mrs. S. Edwards' Hereford heifer, "Leonora." They fairly illustrate and represent the breed. The former suffers somewhat from



HEAD OF HEREFORD COW.

the distortion consequent on foreshortening before the photographic lens, and its muzzle is really finer than it thus appears to be. The latter, shown also in full profile on p. 28, is not only a remarkably characteristic specimen of the Hereford breed, but, taken as a model of perfect form for a meat-producing animal, she was the champion cow of England during her life. Anything more extraordinary in its nearness to the very ideal of perfection in this respect was probably never seen.

* We have to thank Mr. J. Hill, of Felhampton Court, Church Stretton, for the above description and historical account of the breed.

3. **Devons** are mostly bred in their own county and its neighbourhood. They are generally a small breed of red cattle with fine bones. There are, however, two types of the breed—those bred in North Devon being smaller than the animals which feed on the rich lands of Somerset. A few breeding herds are kept in other parts of the South of England, notably one at the royal farm at



HEAD OF DEVON BULL.

Windsor. The oxen of this breed were at one time much used until over five years old for draught purpose, for which their activity specially adapted them. Ox labour is, however, now almost a thing of the past.

From the earliest records of this breed, going back quite 150 years, the true Devon colour has been red, varying from dark to chestnut, and often beautifully mottled. The lighter shades of colour are not so highly esteemed as the other, which is supposed to indicate greater hardiness. They are very neat and level, with a firm touch; when well fed they have small carcasses of the prime beef. They have rather better dairy qualities than Herefords, and thrive well on the somewhat poor and hilly land of

their native districts. And in Dorsetshire, where milk and cheese are of great account, there are several herds of large red cows of the Devon blood, which answer the dairyman's purpose, and satisfy the grazier and the butcher afterwards. A white nose, full eye, and fine horns, are points well considered by Devon breeders. Their herd book was commenced in 1851.

The Sussex breed of cattle are in colour and general character similar to the Devon, but with more size. They have fine lengthy frames, are well adapted for beef production, and are growing in favour in the southern and eastern counties. The Sussex cattle, like the pure breeds, have improved by careful selection. There are several breeders whose herds have occupied the same meadows for generations, and they have known no cross with any other breed. In comparing this breed with the Devon, Mr. Youatt said, "the main point of difference is at the shoulder, and this is the principal defect in Sussex cattle." The rest of his criticism is worth quoting; he adds, "there is more breadth and roundness on the withers—it is a straighter line from the summit of the withers towards the back—there is no projecting point of the shoulder when the animal is looked at from behind, but the whole of the fore-quarter is thickly



HEAD OF DEVON COW.

covered with flesh, giving too much weight to the coarser and less profitable parts. This is certainly a defect, but it is counterbalanced by many admirable points. If there is more weight in front, the fore legs are necessarily wider apart, straighter, and more perpendicular than in the Devon; they are placed more under the body, rather than seeming to be attached to the sides. The forearm is large and muscular, but the legs, although coarser than those of the Devon, are small and fine downwards, and particularly below the fetlock."

He then describes the round deep barrel, straight back, big belly, and great capacity of the regions containing the heart, lungs, and digestive organs, the wide loins and "spread out" hip bones. The bullocks are well ribbed up, and have fine thin tails set on rather lower than in the Devon. This was written fifty years ago in, *Cattle, their Breeds, Management, and Diseases*. Since then great pains have been taken to improve the quality by breeding from the smallest bone and the greatest amount and excellence of flesh; and now the Sussex breed is admirably adapted for the modern system of fattening under cover at an early age; and in the classes for young steers, at our Christmas fat stock shows, surprising evidence of early maturity is shown in the entries of this breed.

The Polled Angus, black or red, the Galloway black, and the West Highland dun or yellow, are excellent breeds for beef, and are very hardy, thriving in bleak and cold situations. They are largely bred in the north of Scotland. The former, pure or crossed with the Short-horn, when well fattened and sent to the London market, either as live animals or dead meat, command the top

price of the market. The late William McCombie at the Paris International Exhibition, 1878, won the premier prize for "cattle of any breed for beef production" with his Polled Scots, and at the sale of his breeding stock in 1880 high prices were realised.

As described by an enthusiastic cultivator of the breed, they are "fine in the bone, with tail like a rat, not ewe necked; short on the legs; with small, well put on head, prominent eye; a skin not too thick nor too thin, covered with fine silky hair; straight back, well ribbed up and home; hook bones not too wide apart—level from the hook to the tail; free from patchiness; deep thighs; well fleshed in the breast, with equal covering of fine flesh all over the carcase."

The average weight of the best Polled Aberdeens at London Christmas market, as consigned by the late Mr. McCombie, Mr. R. H. Harris, of Earnhill; Mr. Reid, Greystone; Mr. Skinner, Drumin, &c., is about 11 cwt.; while much heavier weights frequently occur. Mr. McCombie was accustomed to realise up to £55 per head for commercial bullocks at the various English markets, while his noted Champion oxen at Paris, Poissy, Smithfield, &c., have been described as veritable "mammoth" oxen. And it is said that, bulk for bulk, the black weighs more than other breeds.

At the Paris Exhibition, "open to the world," the group of animals that won, out of the host of categories represented, the "grand prix" of 2500 fr., for animals for breeding purposes, at the same time as they won the "prix d'appétitude" of 2500 fr. for animals for beef-producing purposes—two purposes difficult sometimes to be obtained in one animal—were a group of 2-year-old Polled Angus

cattle, "as even, plump, and ripe as a cherry," and the youngest prized animals in the ground.

As to general prolificness of the breed, we quote the following :—Mr. M'Combie had one season twenty-seven heifers served, three of which were yearlings, twenty-one of which produced calves the following spring.

During the last few years the Polled cattle have continually increased in favour, obtaining every day new

and valuable supporters, making better appearances at shows, and extending far beyond its present boundaries in every direction, with a greater demand for animals for the South of Scotland, England, and the colonies.



HEAD OF LONGHORN BULL.

Dairy Breeds.—Among special dairy breeds, the Longhorned was in high repute for dairy purposes in the midland counties 100 years ago, and high prices were then paid for animals of this breed. It has been supplanted by the Shorthorn, but an attempt is now being made, with some degree of success, to improve and bring it back into public favour.

The black Welsh cattle are very hardy, thrive well on poor land, and some of them are very good for the dairy. Though somewhat slow feeders, when fully ripe the best of them are prime beef, and prove well for the butcher.

The Ayrshire is an excellent dairy breed almost universally kept in the dairy districts of Scotland. Many cows of this breed are imported into English dairies, but the produce of few of them is kept pure, as they are often crossed with a Shorthorn bull. Ayrshires are in colour red or brown and white, mixed often in large patches. They are rather small, standing on short legs, with a light neck, straight up-standing horns of rather over medium length, and a good shaped capacious udder. The Ayrshire is, in fact, a "model"

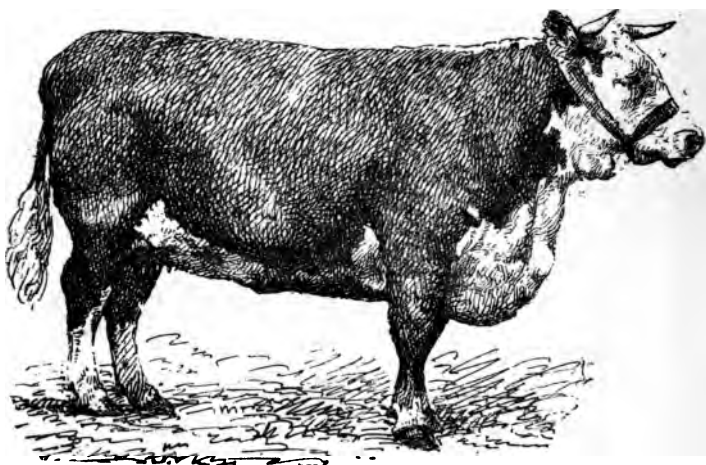


HEAD OF LONGHORN COW.

breed in both senses of the word—for it gives you the ideal form of a cow, and it is the cow rather too much in miniature to be satisfactory to an outsider. It is hardly so large as the Devon. Seen in profile, the body lies between two straight lines, the upper one horizontal, the lower sloping downwards, from the bosom towards the udder, which does not fall below it. It is the belly line and the form and character of the udder which, after all, are the main points which determine the award of merit here. Ayrshire cows become

often rather large bellied, the result of consuming quantities of inferior food. They thrive well on poor land, are capital milkers; when bred on rich land in England they are said to lose some of their natural characteristics.

The red Norfolk Polled cattle are a distinct dairy breed, cultivated to a small extent in the Eastern Counties. The two Channel Island breeds, the pale red or yellow and white



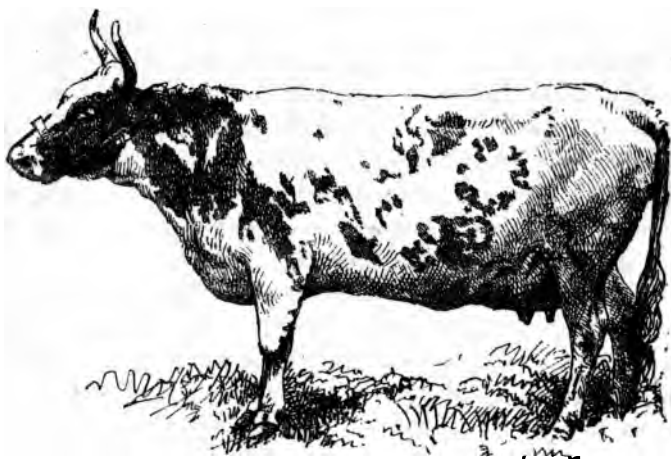
HEREFORD HEIFER.

Guernsey, and the smaller deer-like Jersey, fawn or dun in colour with black points, are specially adapted to produce milk, cream, and butter of fine quality and colour. They have been largely imported, and are now bred in some numbers in the South of England in butter dairies.

They thrive best in a warm situation and climate; giving a fair quantity of very rich milk, and generally calving at about two years old. The Jerseys are light-fleshed,

and their frames not well-adapted for beef production, The Guernseys have more size and flesh with almost equal dairy merits. The Kerry is a small black or red breed, hardy, producing a rich milk, and valuable for its fitness to certain localities in Ireland.

Before, however, proceeding further, reference should be made to the different external conformation of the meat and



AYRSHIRE COW.

milk producing breeds. The engravings, from photographs, of Mrs. Edwardes' Hereford heifer, "Leonora," which took the first prize at all the shows at which she was exhibited, and Mr. Alex. Cassell's Ayrshire cow, "Jeanie," apart from a certain amount of distortion due to the photographic process, very fairly represent the distinctive characteristics of the two sorts. In the former you have an almost perfectly cylindrical body with short thick neck

—heavy ends, both rump and brisket—the thigh and bosom being both extraordinarily developed, and the whole body, flat at top, with ribs spreading almost horizontally, providing a framework on which the best meat on the carcase is thickly and abundantly spread. In the other you have an almost wedge-shaped body, the whole framework developing towards the hind-quarters, the belly line and the back not parallel, but with an interval gradually diminishing towards the front, where the brisket is comparatively narrow and the neck slender; the whole animal much narrower, which is not shown in the engraving. In the case of the Hereford represented the width of the bosom and the distance between the forelegs was extraordinary. The drawings are not only instructive as to the differences between the cow which will spend its food in the production of milk, and one whose food will most of it go to the production of meat. They are also very good illustrations of the two breeds which may be taken as being more characteristically than any other the typical cattle of the dairyman and grazier respectively.

Of the breeds which have been named, then, it will be understood that the Shorthorns and the Longhorns among the larger breeds, and the Norfolk, the Ayrshire, and the two Channel Island breeds among the smaller—are distinctly and especially dairy cattle. The Herefords, on the other hand, the Sussex and the Devons, the Polled Angus, the Galloway, the black cattle of Wales and the rough cattle of the Highlands, are especially meat-producing breeds. But it is the great merit of the Shorthorn that it holds the very foremost place in both of these classes. The exceptional aptitude of the Shorthorn cow to lay on flesh whenever, whether by accident or age, she

has become no longer adapted for the dairy, is a very great addition in the eyes of the dairy farmer to her merit as a mere milk producer. And the unusual power of the Shorthorn bull to confer this character upon his offspring of other breeds is rapidly giving a Shorthorn character to the dairy cattle of those counties where Welsh, Glamorganshire, Longhorn, and other less important local breeds, now almost lost in their purity, once prevailed. It has thus come to pass that while the number of so-called pure-bred, or Herd Book Shorthorn cows in the country is still perhaps smaller than the number which would be pronounced pure of some other breeds,—the Ayrshire, for example—yet the great bulk of the cattle in our English dairy districts are year by year exhibiting a constantly increasing Shorthorn character.

There were in eight of the western counties of Scotland, in June 1880, 157,223 “cows or heifers in-calf or in-milk,” and perhaps 120,000 of these, taking into account also the number of Ayrshire herds in other parts of the island, may fairly be taken to represent the whole number of the Ayrshire breed of dairy cattle. In Hereford and Shropshire there were together 77,235, and perhaps 60,000 may be the total number of cows in the whole country of that large meat-carrying kind. It is not so easy to judge of the number of the less noteworthy local sorts, as of breeds like that of Galloway or Norfolk, which can only be held to occupy parts of counties; but of the Polled Angus there may not be more than 25,000 cows; of Sussex cattle not more than 6000 or 7000; of Devons, large and small—for there are two styles, the former of which may rather be designated Dorsets—there are probably as many as 60,000. No doubt the number of

cows of the Shorthorn breed, as pure bred as many of those already named, is largely in excess of any number here quoted, for all the northern and midland counties of England are full of them ; but, judging from the entries in recent volumes of the Shorthorn Herdbook, and from the numbers disposed of at the annual sales of Shorthorn auctioneers, the entire number of females of this breed which could claim registry in the Herd Book is probably not more than 20,000. Adding to these the herds of pure-bred Highland cattle, of the Channel Islanders, the Welsh and Longhorn breeds, and some other sorts of less importance, which should not be excluded, the whole number of pure-bred "cows and heifers in-milk or in-calf" each June, of the breeds that have been named, can hardly much exceed half-a-million. In addition to these there are more than three times as many large-framed dairy cows in this country, all of which have received more or less strongly the impress of the Shorthorn cross. The dairy districts of Lancashire, Derbyshire, Staffordshire, and Warwickshire, where Longhorns once prevailed, have thus all more or less a Shorthorn character: the dairy districts of Cheshire, where Welsh and Irish cattle once prevailed, are now almost wholly Shorthorn ; and the same may be said of the dairy counties of Gloucestershire, Leicestershire, Somersetshire, Wiltshire, Berkshire, Bucks, &c., where cattle of local breeds formerly were prevalent. On the other hand, in the grazing districts of Yorkshire, Leicestershire, Northamptonshire, Lincolnshire and Buckinghamshire, &c., excepting imported Hereford, Welsh, and Irish cattle (which, however, are now also mostly Shorthorns) one will hardly see any other sort.

General Management.—Where cattle of valuable pedigree are bred, economy of rearing is not much studied, the object being to obtain a well-grown animal without regard to cost. Ample box and yard accommodation is provided, and the calves run with their dams on the pastures in fine weather, or are kept in boxes and turned with them for half an hour several times a day. The calves are early taught to eat linseed cake and bean meal, with hay or grass and cut roots. They are weaned at from 6 to 8 months old, and in winter are kept in boxes or yards partially covered, and fed with hay or chopped straw, and pulped or cut roots, with 3 or 4 lb. daily of linseed cake or other similar extra food. In the following summer they run on the pastures, shelter against sun and rain being accessible to them, and extra food provided if the pastures be scanty. Exercise is very necessary for the healthy development of young animals intended for breeding purposes. Valuable heifers were formerly rarely bred from until they were 3 years old. Many are now served to produce the first calf at 2 to 2½ years old. Where well kept they are more sure breeders, and likely to prove better milkers, when breeding thus early, than if allowed to get too fat before having their first calves.

On some farms in arable districts a number of calves are reared annually to be fattened as young beef under 2 years old. They are suckled, or fed from the pail with milk and boiled linseed or oatmeal, the bull calves being castrated at 2 or 3 weeks old. They are early taught to eat linseed cake and other food. They are kept entirely under cover, in boxes, four or five together, the milk being gradually discontinued at 4 to 6 months old, and the cake and meal gradually increased, the aim being

to keep the young animal constantly improving. The large amount of valuable manure made under cover by cake-fed animals is the special advantage of this system; under which young cattle of good quality, either Short-horns or other improved breeds, can be fattened to a value often over £20 under 18 months old, thus paying 7s. per week for their keep, a sum quite equal to the cost, reckoning the manure as clear profit. New buildings are not needed for this purpose: old-fashioned barns, not now required for their original purpose, can be readily converted into boxes for cattle-feeding and manure-making. An estimate by Mr. T. Bowick of the cost of rearing a young bullock for early beef, taken from the *Royal Agricultural Society's Journal*, vol. 14, is here given.

Purchase of calf	£2	0	0
Four weeks' new milk, 6 qts. daily, at 2d.	1	8	0
Eight weeks' skimmed milk, 6 qts. daily, at $\frac{1}{2}$ d. per qt., and 2 lb. meal at 1 $\frac{1}{4}$ d. per lb.	1	5	8
Seventeen weeks, 2 lb. linseed cake, 2 lb. bean meal daily, with mangel, hay, &c., 4s. 8d. per week	3	19	4
Twenty-six weeks, 5 lb. cake and meal daily, $\frac{3}{4}$ bush. of roots, hay and straw, 5s. 3d. per week	6	16	6
Sixteen weeks, 8 lbs. cake and meal daily, grass, clover, &c., 7s. 2 $\frac{1}{4}$ d. per week	5	15	8
Attendance, 71 weeks at 6d.	1	15	6
Insurance, interest, and rent of shed	1	5	0
	<u>£24</u>	<u>5</u>	<u>8</u>

Upon mixed arable and grass farms, where cattle are reared for beef purposes, it is not usual to fatten them at so early an age, or entirely under cover. A small breeding herd of cows is kept, the calves of which, by a pure-bred bull of good quality, are all reared, and a number of extra young calves are purchased from the dairy districts

at from £1 to £3 each.—Many calves are sent from the dairy districts into counties where they are wanted for rearing, either in horse-boxes, six or under being charged as one horse, or if not exceeding 90 lb., tied up in bags, packed with straw, leaving the head out, per passenger van; they thus travel safely and quickly at moderate cost.—The calves, which are kept in pens near the cattle shed, are suckled twice a day, two on each cow—the calves being early taught to eat extra foods. Strong calves are at 6 weeks old only allowed to suck once a day, and at 3 months old are weaned entirely from milk, other calves taking their places. On some farms the cows are milked by hand, and a number of calves reared upon the milk, either pure or skimmed, with the addition of gruel made of boiled linseed or oatmeal, and a little cattle spice. By either of these means four or five calves may with care be reared fairly well, in the course of one season, with the milk of one cow.

The yearling calves, being well supplied in yards or boxes with good fodder and 2 or 3 lb. per head of cake and meal, are turned out in May upon the clover or pastures, either with or without a small daily feed of mixed linseed and cotton cake, until the following October, when they are taken up into sheds or yards and fed upon roots and straw or hay, with an allowance of cake and meal, beginning at 4 lb. each daily, and increasing gradually until for the last two months 10 lb. to 12 lb. is given daily, the young beasts being saleable fat in June at from 2 to 2½ years old at nearly £30 each.

Where heifer calves are reared for keeping up the numbers of the dairy, they are not generally allowed to suck, but are fed from the pail, having from 4 to 8 quarts

of new milk daily for three or four weeks, and then skim milk with the addition of boiled linseed, &c., for six or eight weeks longer. They are turned out to grass in the summer and autumn, 1 lb. per day apiece of pure linseed cake being continued to them. This quantity is increased to 2 lb. in the following winter, or 1 lb. of decorticated cotton cake is added; the calves being either kept in sheds or yards, or, in grass land districts, on the pastures with some hay, and perhaps a shed for shelter. The practice of giving cake to young store cattle is found beneficial and is increasing.

Success in breeding cattle depends very much upon the selection of parents of good blood and quality. As one male animal may become the sire of a large number of calves, special care should be taken to secure one of the desired quality and hereditary qualifications, all unsound or delicate animals being rejected. Some of the chief obstacles to the profitable breeding of cattle are barrenness, abortion, and the loss from disease. Cows not unfrequently fail to breed regularly. In this case, unless they are of special value, they may be fattened without the owner suffering loss. High-bred cattle are specially subject to barrenness, whether from being too closely in-bred or from being kept artificially and in too high condition.

The average period of gestation is forty weeks, but individual cows vary considerably. When cows exceed their ordinary time, there is a much greater probability of male produce. Great disappointment arises to many breeders from their cows slipping their calves at various stages of pregnancy. It is often impossible to trace the cause. Some pastures infested with ergot are said to produce it; mouldy or flooded hay, frosted or decayed

roots, foul water, contact and sympathy with other cattle which have lately aborted, sudden fright or rough usage—all these causes account for a large number of cases. It sometimes occurs, with the most careful management, to cows in every variety of condition. It is seldom dangerous to the cows, and they will often fatten quickly after its occurrence; or, if it occurs at a late stage of pregnancy, and the after-birth be not retained, if stimulating food be given freely without delay, dairy cattle will often give an abundant supply of milk. Cows which have once aborted are more liable to do so again, though they not unfrequently overcome the habit.

From April to October cattle are fattened on pastures, the best land being reserved for this purpose. One large beast per acre may be fattened on the very best land. The practice of giving extra food with grass is increasing. A mixture of equal parts of linseed cake and decorticated cotton cake is very suitable for grass feeding, and from 4 to 6 lb. per day may be given at from 2s. 6d. to 3s. 6d. per week, the cattle fattening more quickly and greatly improving the land. Even half the above amount at a cost of 1s. 6d. per week is often of marked benefit to the fattening of the cattle. There is often a glut of half-meated cattle in October which are sold at a price leaving very small profit to the feeder, and the use of cake enables the feeder to bring his stock to an earlier and better market. A very large number of well-bred Irish store cattle are imported every spring, and purchased for grazing in this way on English pastures.

A certain amount of shelter is desirable for cattle even in the summer months in the changeable climate of the British Isles. Hedges between pasture fields should not

therefore be kept too low, especially in exposed situations. The profits of purely grazing farms are dependent upon the price at which store cattle can be bought in spring, the abundance of grass, the suitability of the season for the thriving of stock, and the demand for beef in the summer and autumn. In winter the fattening of cattle is principally in the arable districts, where the straw and roots require conversion into manure. A liberal allowance of cake or meal is generally given with roots or chopped straw or clover. Excepting for the value of the manure made by these well-fed animals, this winter fattening is rarely profitable, the cost of food, bedding, and attendance being heavy. The manure thus made under cover by animals freely consuming cake is, however, of great value to the farm. The immense and increasing imports of American fat cattle and dead meat have lessened the price of beef and greatly reduced the profits of British graziers. Breeding or dairy cattle when dried for two or three months previous to calving do not require a forcing diet, and are kept in the winter months on straw and roots or coarse hay.

Cows over 4 years old, if in high condition at the time of calving, are liable to parturient apoplexy, commonly called milk fever—a very fatal malady, which occurs within a week or generally within three days of calving. The risk of loss from this disease is lessened by reducing the keep before calving, and giving one or two doses of 1 lb. of Epsom salts and 1 oz. of ginger just before calving. In cases where the udder is very full, the cow should be milked occasionally previous to calving. Attention to these precautionary measures would generally prevent losses from this cause.

Young calves when fed with the pail, crowded together in pens, and not kept sweet, or when the cows are kept on very rich and scouring food, are often affected with diarrhœa, the "white scour;" a very sparing diet is necessary, with various medicinal remedies. If not checked the disease is rapidly fatal.—The hoose, which is due to the presence in the bronchial tubes and windpipe of small threadlike worms, attacks calves or yearlings in the early autumn when grazing upon some pastures. The continual coughing to expel these worms exhausts the calf. Doses of two tablespoonfuls of turpentine, mixed with as much linseed oil, given every alternate day, are useful to kill the worms; and liberal keep to maintain the strength of the calf is necessary. The fatality from this disease is much greater in some seasons, and in some localities. It is especially dangerous on this account to turn calves on pastures recently flooded.

Cattle reared entirely under cover never suffer from this disease, and but rarely from black quarter, which is very fatal on some farms. It is a blood disease which rarely attacks cattle over 18 months old. It is practically incurable. The calf is struck suddenly, a swelling being often observable on limb or back, which, on pressure by the finger, gives a peculiar rustling sound. Setoning the dewlap at 3 to 6 months old, and periodical saline doses are preventives which are said to be effectual. The setoning should always be done on those farms where the disease has been prevalent. Regular and good keep, avoiding sudden changes, too forcing diet, or exposure to very cold winds, is also desirable. The regular use of a moderate allowance of linseed cake is a safeguard, this extra food being safer for cattle under 15 months old than cotton cake or any kind of corn meal.

Diseases of the digestive organs are not unfrequent. The clogging of the first stomach with undigested food, and the consequent formation of gas which cannot find escape, often causes an alarming distension threatening rupture. In this case the use of the probang, a flexible tube passed down the throat, may give relief. The treatment of disease is not, however, capable of discussion in these few pages. The reader is referred to our last chapter for a statement of the main principles on which the preservation of health depends.

The two diseases of foreign origin, pleuro-pneumonia and foot-and-mouth disease, have in past years caused incalculable loss to the British farmer, but we may hope that the continued enforcement of measures regulating the cattle traffic will prevent the frequent recurrence of them. The former disease may remain dormant in an animal many weeks, but when detected, should always be dealt with by prompt slaughter of the infected animal.

Foot-and-mouth disease shows itself in from two to seven days after infection. It is not commonly fatal, except to young sucking animals, and requires little treatment except good nursing. Purchasers of cattle which have been exposed, on travel or in markets and fairs, to risk of infection, should as far as possible keep them isolated from other stock until they are proved to be healthy. The evidence in favour of the beneficial effect of sanitary regulations in preventing the spread of these diseases is unimpeachable, but recent outbreaks have been clearly traceable to the import of live animals, and it is evident that no absolute safety of our home stock can be obtained until a foreign dead meat trade is substituted for the import of live animals.

CHAPTER II.

DAIRY MANAGEMENT.

Statistics—General Management : Food—Shelter—Treatment—Milking.
Milk Production : The Milk Trade—Quality of Milk. **Cheese-making :**
Cheddar—Cheshire—Derbyshire—Gloucester—Leicester—Lancashire
Stilton—Bath—Cream Cheese. **Butter-making :** Processes—Setting
Milk—Churning—Making—Salting.

THE milk produce of Great Britain has been estimated at about 1,000,000,000 gallons annually, the produce of rather more than 2,000,000 of cows and heifers, which are returned in our agricultural statistics as in milk or in calf in June of each year. The quantity of milk consumed in rearing and fattening calves has been variously estimated at from one-sixth to one-eighth of the above produce. We think the former estimate nearest the mark.

We have no accurate statistics to guide us as to the amount consumed in the form of milk by our population, but it has been estimated at 1,000,000 of imperial gallons per day, being at the rate of one quarter of a pint daily per head of the population. The quantity thus consumed is yearly increasing with improved facilities of delivery and distribution ; and with the increased means and we trust the more sober habits of the working classes.

The remainder of the milk produced is devoted to the making of cheese and fresh butter. The production of cheese is much diminished in consequence of the increased

demand for fresh milk and large importations of American cheese of improved quality. Dairying as a whole is, however, now on the increase, the profit derived from it being, under good management, generally superior to that from fattening stock.

We propose to describe shortly the general management of dairy cows, the feeding of dairy cattle for the production of milk, the milk trade, the making of cheese of various kinds, and the making of butter, fresh and cured.

General Management.—In ordinary summer dairies, the cows and heifers calve from January to May, the younger cows and heifers calving latest. Cheese is made best and at least cost from cows at grass when in the height of their milk production. In dairies, however, which supply milk to towns, or where fresh butter is largely made, it is important that cows should calve all through the year, as a regular supply is needed; and although it costs much more to produce milk and butter in the winter season, the extra price then ruling for milk or fresh butter repays it. In the winter feeding of dairy cattle a liberal supply of roots is desirable, and where this is unattainable must be made up for by an extra supply of cake or meal, or the use of brewers' grains. Some good meadow hay or well-got clover is always desirable for cows in milk, and may be given uncut. Straw or inferior hay should be cut into chaff and mixed with pulped roots or grains and soaked malt dust. Mangels are preferable to swedes or turnips for milch cows, as the latter are apt to taint the milk or butter with their peculiar aroma. Many parts of Great Britain are, however, unsuitable in ordinary seasons for the profitable growth of mangels, which need plenty of

sun and a warm soil, whilst swedes thrive best in a cool, moist soil and climate. The objectionable flavour of swedes may be avoided in great measure by pulping them, and mixing with chaff flavoured with soaked malt dust. In cheese-making the flavour of turnips is not perceptible. Where both swedes and mangels are grown, the latter are best reserved for giving whole, and for use late in the season, when swedes are often decaying.

Chopped straw, mixed with say 20 lb. of pulped roots, 2 lb. malt dust, 3 lb. rice or maize meal, and 4 lb. decorticated cotton cake or meal, with one or two fodderings of good long hay or clover, and 20 lb. of whole mangels, form a good ration for a dairy cow in full milk in the winter season. The cost of the cake, meal, and malt dust amounts to about 3s. 6d. per week. Where brewers' grains can be obtained close to the farm at from 3d. to 5d. per bush., they are not dear for stock, and from two to four pecks per day may be given, but a few roots in addition are desirable to prevent clogging of the stomach. Under such a diet milch cows yield liberally good milk without sinking in condition. Under only an ordinary diet of hay or straw and roots, cows giving milk freely must become low in condition, and their power of milk production is liable to become impaired.

Cows in milk are better kept moderately warm in the winter—they feel cold more than cattle not in milk; but it is not desirable to make them tender by too close confinement when they are to be pastured afterwards. In country dairies they are usually allowed to be out altogether, from early in May until October or November, being brought in for milking, and it may be for some extra feed twice daily.

The system of feeding cattle entirely in houses throughout the summer, bringing them regular supplies of green fodder, is strongly advocated by some for milch cattle. It is specially suitable for sewage farms, and for dairy farms chiefly arable, some of which in suitable localities might with profit be devoted to dairying. Where land is specially cropped to meet the probable demands for green fodder at various seasons of the year, arable dairy farming may be profitably carried out on what is called the soiling system, but on dairy farms of ordinary pasture we consider the present system of turning cows out to graze on the pastures will continue to be found the most economical.

The choice of foods, whether grown on the farm or purchased, depends greatly upon the locality. For instance, in the neighbourhood of a great seaport, where foreign cake or meal can be purchased cheaply with little cost of railway conveyance, it may be most desirable to use this; whilst in inland districts the meal of home-grown corn, brewers' grains, bran, and malt dust may be cheapest to use.

In the use of extra foods for milch cows, discrimination should be used in the apportionment of varying quantities to individual animals, according to their special requirements, their milking capacity, and their condition as to age. Some cows will pay well for a liberal allowance in increased supplies of milk, and require more liberal diet to make up for the large drain upon their system, whilst other cows do not require, and will not pay, for forcing keep. Heifers two and three years old when milking freely require some extra food to enable them to grow in size as well as to milk abundantly. For want of this many animals which milk freely with their first calve

are checked in their growth, and never attain their proper size.

The treatment of dairy cattle should be careful and rational. The water supply should be pure and plentiful, the sheds clean and well ventilated. The cows must not be driven fast or excited and their tempers spoilt by loud noise or blows. The milking of the cows must be performed with thoroughness and regularity twice daily, at as nearly regular intervals as possible. In exceptional cases, where the udder is very full, or there is difficulty in getting the milk away, it may be advisable to milk for a while three or even four times daily.

The habit of milking well is most easily acquired when young. The difficulty in getting good milkers is an obstacle to the extension of dairying in new districts, where the farm labourers have never learnt to do it well. No milking machine, as yet brought out, has proved of practical utility. If the milk be not all regularly and quickly drawn, the yield of milk rapidly falls off, and cannot be recovered until the cow calves again.

Milk Production.—The feeding of dairy cattle with a view to a profitable production of milk receives far more attention than formerly, when, in ordinary country dairies, extra feeding stuffs beyond the grass, hay, straw, and roots of the farm were rarely supplied to dairy cows. It is now generally understood that a moderate allowance of cake or meal, judiciously selected according to cost, and given to cows in full milk, brings a higher return in increased dairy produce than it would in beef if given to fattening animals. It is not always profitable to give extra feed to cows when grazing on abundant pastures in the summer

season, but the use of 3 lb. per head daily of decorticated cotton cake, or 2 lb. of decorticated cotton cake and 2 lb. of maize or rice meal, at a cost of from 1s. 6d. to 2s. per week, increases the yield and quality of the milk, improves the condition, and if young, the growth of the milking stock ; lessens somewhat the consumption of grass, and maintains and improves the condition of the pastures, which is somewhat reduced by the grazing of dairy stock not supplied with extra food. The profit of the use of extra food on grass will depend upon the price of dairy produce, the price of the extra food, and the character of the stock. Where dairy farms are partly arable, it will be desirable to provide, for autumn use, some forage crop to supply succulent food when the grass fails. The crop grown most profitably for this purpose will depend upon the nature of the soil and climate. Where these are suitable, cabbages are a profitable crop, and supply in the last four months of the year excellent food for milk production. Italian rye-grass, clover, rape, vetches, kohlrabi, or mangel tops are all useful aids to milk production in the autumn.

The supply of country milk to large towns is of comparatively modern introduction, having grown up in the last twenty years, and it is extending yearly with rapid strides. The cattle plague swept away large numbers of cows in London and other towns ; the increasing demands upon space in the neighbourhood of crowded populations, and the requirements of sanitary authorities of towns as to the construction and condition of town cowsheds, have also discouraged cowkeeping in towns, whilst the facilities offered by the various railway companies for the speedy, safe, and cheap conveyance of

milk, have contributed to the extension of the trade ; and at the same time the greater purity of the milk supplied, partly due to the Adulteration Acts, has increased the demand for it. A large proportion of the milk from the counties of Derby and Leicester, formerly made into cheese, is now sent to London. Some large dairies exist in London and the suburbs, but the great bulk of the supplies are received by rail.

On many farms near a railway station, where a tolerably regular supply can be forwarded, nearly the whole of the milk is sent by rail. On other farms cheese or butter is made in the summer, and the milk is only sold when scarce, the price then being better than that obtainable by making it into cheese or butter.

Most of the milk sent up to London is purchased by large dealers, either private individuals or public companies, who deliver much of the milk to retailers, who in their turn distribute it to the public. The average price at which milk is retailed in London is 4*d.* per quart, some being sold in the spring months at 3*d.*, and 5*d.* being charged when milk is scarce. The disproportion between the price paid by the town consumer and that realised on the farm is great, and may be capable of some reduction, but the labour of distributing, often twice daily, small quantities over wide areas, is considerable in proportion to its value.

The thorough cooling and aëration of milk before despatch by rail is found necessary to secure its keeping. To secure this end Lawrence's patent refrigerator, in which the milk is poured over a large exposed metallic surface kept cool by a current of cold water beneath it, is far the best appliance available. The milk when it

comes from the cow, after being strained, is, by being passed over the refrigerator, through which a stream of cold water is running, reduced at once from 90°, or blood heat, to below 60°, at which heat it will bear carriage with safety, even in the hottest weather. Without such cooling and aëration it will not keep sweet twenty-four hours. It is conveyed by rail in large cans; those most in use in the London trade holding 17 imperial gallons or 8 barn gallons—a local measure of 17 pints, still clung to by the dealers.

Milk vans are put on the early morning and evening trains, the milk travelling at express speed in time for distribution a few hours after its production. The price received by the country producer varies from 6½*d.* to 8*d.* per imperial gallon for four or six summer months, to 8½*d.* to 10*d.* in the winter, clear of all cost of carriage: higher prices being sometimes paid when milk is scarce.

The sender generally finds cans if he sends regularly, but for those who only send a portion of their milk the dealer finds all or a portion of the cans. The last improvement in the making of cans is the substitution of tinned steel for tinned iron as the material. It is believed that their greater hardness will make them last much longer and avoid much of the leakage caused by the rough treatment cans receive in transit.

Dealers when purchasing dairies of milk often require a maximum and minimum quantity to be named in the contract, as in the winter the supply often falls short of the demand. They also retain the power of stopping the supply for a meal or two, when an over supply or a slackening demand occurs. The dairy farmer who supplies milk ought to have the means of converting his milk into

cheese or butter when it is not wanted for sale. He is thus rendered more independent, and able to make the best of his produce. The best return may often be made from a combination of the sale of milk and the making of cheese and butter, the milk being for the time applied to whichever purpose pays best. Dealers often obtain extra supplies of milk from the cheese factories existing in Derbyshire or elsewhere, which, when situated near to rails, arrange to supply at a fixed price as much milk as is required (instead of making it into cheese), whenever apprised by letter or telegram of the dealer's wants.

A noteworthy feature of the present milk trade is the success which some public companies influentially supported, and commanding the confidence of both producers and consumers, have recently obtained.

In many rural villages a supply of pure milk can only be purchased with difficulty, and we know cases where the children of agricultural labourers have not tasted milk during childhood, from the day they were weaned. The consumption everywhere falls far below a desirable quantity. Improved supply is found to create a demand, and a source of profit not inconsiderable is thus being developed.

Various tests of the quality of the milk are commonly used. The cream gauge enables the number of degrees of cream (say from 8° to 14°) in 100 parts of pure milk to be read, but this is far from a complete test when applied to milk which has been disturbed by carriage to London. The lactometer enables the specific gravity to be ascertained, which averages about 1032 (water being 1000); and with these two tests a fair opinion may be formed of the quality. An analysis showing the propor-

tion of solid and of butter fat is, however, the only absolutely trustworthy guide,* and to take this accurately requires both time and skill. The sale of milk upon terms in some measure based upon a standard of quality, though desirable, is not yet the rule.

Cheese-making.—The variety of kinds of English cheeses, each one made upon a principle in some measure distinct, is considerable. The principal whole milk cheeses are Cheddar, Cheshire, Derbyshire, Gloucestershire, Leicestershire, Lancashire, and Stilton. There is also in some localities a considerable production of skim-milk cheese. We give one or two examples. The Cheddar system may be shortly described as follows. The morning's and evening's milk are put in the cheese tub at a temperature of about 80° Fahrenheit, and sufficient rennet (a coagulating fluid † prepared from the stomachs of sucking calves) is added to make the curd set in an hour or less. The curd is then slowly cut with a breaker—either a wire sieve of large mesh thrust up and down and to and fro, or a set of parallel knives set near to one another in a frame, and used in a similar way—great care being taken not to mix the curd up with the whey. Heat is then applied to raise the temperature to from 95° to 100°, in order to harden the curd and complete the separation of the whey, which is then removed. The curd is piled up in the cheese tub, cut, and turned over and allowed to remain for half an hour, when a certain degree of acidity is developed. The remainder of the whey is then drained off, and the curd

* See Handbook of the Chemistry of the Farm. † See Appendix.

cooled before grinding or breaking, when it is packed in the vat, surrounded by a cloth of open texture, pressed, again ground or broken up, and salted at the rate of 1 lb. of the salt for 56 lb of curd, and again put in the press. The cloth is changed the following morning, and either on that or the succeeding day a calico bandage is fastened round the cheese. On the third day it may be taken from under the press and placed in the cheese room, the bandages being kept on, and the cheese turned daily. A regular temperature of about 65° is most suitable for ripening the cheese, and it requires about three months' ripening before being ready for sale. This temperature is generally best maintained by means of hot-water pipes surrounding the room, heated either by a stove boiler, or by a boiler connected with a cooking grate. A stove within the cheese-room or hot-air pipes will answer for this purpose. Cheddar cheeses are generally made large and deep, the usual sizes being from 56 lb. to 120 lb.

In Cheshire milk is set for cheese at about the same temperature as Cheddar, but the rennet is commonly made fresh daily; and the first process is the same, though heating the curd after the first breaking is done by some but not all makers. The whey is drained away and the curd left to get firm; when sufficiently firm it is cut into cubes of about 1 lb. weight, and lifted on to a drainer or rack covered with a cloth, where it remains for three-quarters of an hour or more. When dry enough it is broken up by hand, and from 3½ to 4½ lb. of salt per cwt. well mixed with the curd. It is afterwards twice passed through the curd mill, and put in a vat with a weight upon it for from one to two hours. It is then put in an oven or warm chamber provided for the purpose, close to the fire of the dairy room,

where it remains until the following morning. The warmth of the oven (80° or 90°) promotes the separation of the whey, and skewers are used to pierce the curd through the holes of the vat, to cause the escape of the whey. Some degree of acidity is developed in the curd, and it settles down into a compact mass. The cheeses are turned upside down in the vat with a fresh dry cloth, and put in the press for about three days, being turned and dry-clothed once or twice daily. They are then bandaged and removed to the cheese room, being at first turned daily, afterwards less frequently, until ready for sale. As a rule Cheshire cheese ripens quickly, and is sold for consumption from one to three months after it is made.

The Derbyshire and Gloucestershire systems resemble each other, and may be described as follows:—

The evening's milk is cooled and kept till the next morning, and it is then mixed with the morning's milk, the temperature raised to 80° to 85° , and sufficient rennet added to coagulate it in an hour. The curd is gently broken with a curd breaker, and a metallic press sieve plate allowed to sink slowly through the whey upon the curd, the whey being then let off by a tap or baled out. The press plate is gradually let down on to the curd, so as to press out the whey; the curd is cut with a knife and heaped up in the kettle, and the pressure again applied. When dry enough, it is broken up or ground once or twice, some of the best makers mixing a small quantity—say 1 lb. to the cwt.—of fine salt with the curd, which is then vatted and put in a lever press, taken out again, and cut or slightly broken and re-vatted. The cheeses, which are from 16 lb. to 28 lb. each, are rubbed over on the outside with salt, and fresh dry cloths are put on daily for three

days, while kept in press. They are then removed to the cheese room, kept in a temperature of from 60° to 70°, and sold when ripe at from six to twelve weeks old.

In Lancashire, cheeses about four to the cwt. are made very much as those of Derbyshire, except that the salting is sometimes done—not by mixing salt with the ground curd, as must be done in Cheshire or Somersetshire, where large cheeses are made, nor by rubbing the surface with salt, as is done in Gloucestershire and partly in Derbyshire, but—by floating the cheese in a vat of brine for three or four days after it has acquired form and substance. The curd, when once it has been fairly drained free of whey, is placed in a cloth under pressure for half an hour, and then opened up and rebroken, and again subjected to pressure. It is ultimately put through a curd-mill, and ground as fine as grains of corn. The ground curd is put in vats holding a quarter of a cwt. each, and placed under full pressure for some hours; after which it is taken out and replaced in a dry cloth, and subjected to a day's pressure. After this it is placed for a period of four to six days, either each in an earthenware vessel of proper shape and size, or several together in a long wooden trough, in a brine in which it floats, and from which it absorbs sufficient salt, and becomes hard and firm in the process. In a few days this process is completed, and the cheese is taken out, wiped dry, and placed on the floor of the cheese-room, and turned occasionally, until it is ready for sale.

Both in Gloucestershire and Cheshire, not universally however—also in other districts less generally—it is a not uncommon practice to use artificial means in order to give to cheese a yellow and sometimes even an orange colour.

A small quantity—about half-a-gill per 100 gallons—of liquid annatto is for this purpose mixed with the milk before the rennet is added: giving it a richer, more creamy colour than it naturally possesses—a colour which is almost wholly carried down by the curd, so that the tint becomes much stronger in the cheese. This is not now, however, so commonly done as it used to be. A cheese of natural colour is now generally preferred, and a nasty and to some extent expensive practice is dying out.

Mention should here be made of the great importance, which is everywhere acknowledged, of a good cheese-room—one which can be kept at a uniformly warm temperature, especially during the early months of the cheese manufacture. On this a great deal depends for the proper ripening and maturing of the cheese: a process which is materially shortened as well as brought to a more successful issue, where sufficient warmth can be maintained without any liability to changes of temperature.

Stilton cheese—manufactured chiefly in Leicestershire—is made from milk enriched by the addition of cream, and the curd hardens into cheese without pressure. The cream of the night's milk is added to the new milk of the morning, and the rennet is mixed with it when the whole is at the temperature of 84° Fahr., enough being used to make it coagulate in an hour and a half. If it comes sooner it will be too tough. The curd is not drained of its whey in the ordinary manner, but is removed in slices with a skimming-dish, and placed upon a canvas strainer; the ends of which, when it is full, are tied up and the whey gently pressed out. It is then allowed to drain until next morning, when it is removed and placed in a cool dish; whence, cut in thin slices, it is put in a hoop

made of tin, about 10 inches high and 8 inches across, and pierced with holes. A clean cloth is placed within the hoop, and, as the slices are laid in, a small quantity of salt is sprinkled between the alternate layers. It remains in the hoop, covered up, but without pressure. Next day the cheese is taken out of the hoop and clean cloths are applied; after which it is inverted and replaced, and pricked with skewers through the holes of the tin hoop, to facilitate the extraction of the whey. In four or five days the curd becomes firm. During this consolidating process the cheeses are kept in a place where the temperature can be maintained at about 100°. When the cheese has become firm enough, it is pared smooth and firmly bound up in a strong fillet of canvas, wrapping it round several times. The binders and cloths are removed every morning; cracks are filled up with curd; and ultimately the coat becomes hardened, and the cheese is removed to the drying-room.

Bath cheese may be named, although it is little else than a household delicacy. To one gallon of new milk two quarts of water are added, and two tablespoonfuls of rennet. When it is coagulated, the curd is taken gently out of the vessel with the skimming-dish, and laid in a small vat of suitable size—perhaps 9 inches across and 3 inches deep—a canvas cloth being previously placed in it. Dry cloths should be applied every twelve hours for two days, when the cheese should be turned out on a plate, with another over it, and being turned occasionally it will be fit for use in a fortnight.

Cream cheese may be made from a quart of cream, to which, perhaps, a pint of new milk may be added. It is warmed in hot water to about 90° Fahr., and a table-

spoonful of ordinary rennet is added. It is let stand till it thickens, then broken slightly with a spoon and placed in a frame 8 inches square and 4 inches deep, in which a fine canvas cloth has been placed ; and then it should be pressed slightly with a weight. It stands for twelve hours, after which it may be lifted out and re-placed in a finer cloth over which a little salt has been powdered. It is fit for use in a day or two ; but is a mere household delicacy.

Cheese factories, which have been found highly beneficial in America, have been introduced into this country in Derbyshire, Cheshire, and Somerset. Although they have been, on the whole, fairly successful, they do not increase in number, one reason being the great extension of the milk trade, which diverts the supply of milk.

Factory cheese is now mostly classed as Derby cheese, chiefly because it resembles it in form and size ; cheeses of from 25 to 30 lb. being found most marketable. The method of manufacture and the character of the cheese is, however, quite distinct from that of the Derby dairies. The American system of cheese-making, a modification of the Cheddar, is generally copied in English factories. After the curd is broken, the temperature is raised to 90° to 100°, and thus a degree of acidity developed which promotes the perfect separation of the whey. The cheese is entirely salted in the curd, from 2 lb. to 2½ lb. per cwt. being applied. The cheese is made with comparatively small expenditure of time and labour. Stored in good keeping rooms of a temperature of 60° to 70° it ripens quickly ; but like the American cheese, it is somewhat perishable, and deteriorates by keeping after it is ripe. In a well managed large cheese factory the cost of making

and the waste are reduced to a minimum. Milk supplied to these factories is paid for by weight, a gallon being taken as 10 lb. (it actually weighs about 10½ lb.).

The yield of curd varies much in the different months of the year, the chief cause being the distance from the time of calving. Thus whilst it takes nearly 11 lb. of milk to make 1 lb. of cheese (weighed green) in May, 9 lb. will produce the same weight in October. The shrinkage of cheese from the time it leaves the press to the time it is marketable, may be taken at about 10 per cent.

The whey from the cheese tub is usually put in vats or tubs a few inches deep, and after standing twelve or twenty-four hours, the cream which rises to the top is skimmed, and afterwards made into butter. This is inferior to milk butter, but where well managed it is sold at a price not much below it. In some cases the sweet whey, instead of being set for cream, is at once heated, and the cream then rises at once. Whey is used as pig food mixed with meal, and under good management produces a profit not inconsiderable. Scalded maize meal, rice meal, and bran, or pea or barley meal are suitable to give with the whey. Strong store pigs of from 4 to 6 months old, when supplied with meal to the value of from 1s. 6d. to 2s. 6d. per head per week, with abundance of whey, will increase in value from 4s. to 5s. per week, one-half of which will be the profit on the consumption of whey. About one strong pig for every two cows may be kept in the season, and such pig will readily fatten in twelve to fourteen weeks. The value of the whey for pig feeding may be estimated at from £1 10s. to £2 per cow. The yield of cheese per cow in the grass season depends greatly upon the milking capabilities of the cows and their

keep and management. It averages from 3 cwt. to 4½ cwt. of ripe cheese per cow, in addition to the milk required for feeding calves at the start of the season.

The best quality of cheese is made from grass ; fodder-made cheese, however perfectly made, being somewhat inferior. Much inferior cheese is made, and the fault is not infrequently laid upon the character of the land, the manures or draining which may have been carried out, or anything except what is generally the cause—viz., defective management. Some pastures are unquestionably superior for making fine cheese, but, as a rule, the quality depends chiefly upon the maker. Dairy cows require good food, pure water, and careful management. Milk must be kept clean and sweet ; if kept twelve or twenty-four hours before being made into cheese, it must be cooled and kept in a clean well-ventilated dairy. The temperature at the time of setting, the use of a sufficient quantity (but no more) of good rennet to coagulate the milk within an hour, careful treatment of the curd to avoid waste, the perfect separation of the whey, the proper curing of cheese by salt, which is best applied either wholly or in part well mixed with the curd, the storing of cheese in suitable rooms of proper temperature ; these are all points of importance common to every system of cheese-making.

The Manufacture of Butter.—We have no means of ascertaining the actual consumption of butter in England, but it is very great, and, unlike that of cheese, it is yearly increasing. In addition to the large amount produced at home, we have an enormous import which increases year by year, and is of the value of £10,000,000 or £12,000,000

sterling. It is scarcely creditable to our dairy industry that so large a sum should be paid for what we might profitably produce at home; and it must be admitted that a large proportion of our home-made butter is, from defective management, inferior in quality to much that is imported from France and Denmark.

In describing shortly the details of successful butter-making, we will first mention a few of the causes of inferior quality—(1) a want of cleanliness in dealing with the milk, and of suitable dairy rooms for setting the milk—well-ventilated and free from any strong odours; (2) leaving the cream so long on the milk that it becomes sour; (3) not churning often enough, churning at wrong temperatures, or too fast, and not stopping soon enough when the butter begins to come; (4) not getting out all the buttermilk, or leaving too much water mixed with the butter; (5) over salting, using or imperfectly mixing coarse and inferior salt; (6) working the butter with the hands; (7) want of tidiness in preparing and sending it to market; (8) feeding cows on turnips or other strong flavoured food, or giving them foul water; also (9) injudicious driving of the cows before milking.

There are two distinct systems of setting milk, each of which has its advocates. The one is setting the milk in shallow pans in dairy rooms of the temperature of from 50° to 60°; the other the deep setting the milk at a low temperature of about 40°, obtained by the use of ice or very cold spring water. The latter system finds much favour in the North of Europe, and also in America, varieties of it, being known by the name of the “Swartz,” the “Cooley,” and the “Hardin” systems. The chief advantage of these systems is that the milk is kept sweet

and pure ; and excellent keeping butter, free from casein, and therefore not likely to taint, is produced.

Where butter is made for sale whilst fresh, as nearly all that produced in England is, an equally good result may be obtained on the shallow setting system ; and as supplies of ice or water sufficiently cold are frequently unattainable here, we do not think the system is likely to become general. It is found that cream rises best when the temperature of the milk is falling somewhat rapidly, and though this separation takes place under the cold setting system, the cream obtained is thinner and less concentrated than that obtained by shallow setting.

A comparatively recent invention is the centrifugal cream separator, by which cream can be almost perfectly separated immediately after milking. This plan, however, requires the application of power, and is scarcely likely to become general, except in creameries or very large dairies. One advantage of the system is that the skim milk is obtained perfectly fresh and suitable for sale wherever there is a demand for it. Excellent pure-flavoured butter is obtained from the cream resulting from this use of the separator. It is usefully employed in some of the large London dairy establishments.

We will now describe the shallow setting of milk. The milk, when brought from the cow, is carefully strained and put in shallow pans, from 2 to 4 inches deep, made of well-tinned iron, glazed earthenware, or glass, all of these non-porous materials which can be kept perfectly sweet by the use of hot water. The pans are set in a dairy the temperature of which in winter should not sink much below 50°, and in summer should be kept as cool as may be. The room should be well ventilated, and no odours

of meat, vegetables, or smell from drains, should be permitted. The cream should be carefully skimmed off at twenty-four hours, and the milk be used for feeding pigs or rearing calves, having considerable value for either purpose, when suitably mixed with meal. Some farmers churn all the milk without setting for cream. This plan has, however, nothing to recommend it. If churned sweet it is a wasteful plan, and all the butter is not obtained, whilst if, as is usually the case, it is lapped or soured before churning, the quality of the butter is sacrificed, there being a considerable mixture of curd in the butter. The purest butter is made from perfectly sweet cream. Cream when put in the churn should be of the temperature of about 60°, or a little lower in the summer season. The cream is in cold weather best raised to the required temperature by floating some of it (to be afterwards mixed with the rest) in a tin vessel or a boiler of hot water.

Improved churns are of various shapes. One which has taken the lead at recent competitions at the "Royal" and other shows is Messrs. Thomas & Taylor's eccentric barrel churn, which has no beaters, but pegs fixed inside. Another excellent barrel churn (Waide's Victoria) has, also, no dashers, but works end over end. The churning should be done steadily, a pace of from fifty to sixty revolutions per minute being found desirable. There is a ventilating peg in some of the best churns, which is removed occasionally during the first ten minutes of churning to give ventilation. Some are also fitted with a small glass window, by which may be seen the first signs of butter coming. Churning should be stopped as soon as the butter forms, or the quality will be injured. The time occupied in churning usually varies from twenty

to sixty minutes ; but where the temperature is too low, or the cream is from the milk of old-milched cows not liberally fed, churning is sometimes a tedious and unsatisfactory operation.

As soon as the butter is formed in small particles, and the period is at once recognised by the altered feel of the work to any one engaged in churning, some of the buttermilk is let off by means of a plug, a hair sieve being used to prevent waste, and the little butter which flows through the tap is returned to the churn. Cold water is added to the churn and the process recommenced. The process is repeated, and the churn is then half-filled with pure cold water, and after a few revolutions the water let off. This process is repeated until the water comes out of the churn as clear as when it was put in. The butter may then be taken out with a pair of wooden patters without coming in contact with the hand. The water may be pressed out, and if desired a little fine salt mixed with the butter by working it with the wooden patters, or by the use of a mechanical butter-worker. There are circular butter-workers which are of use in improving the condition and purifying inferior or badly-made butter, but when butter is thoroughly well managed from the first they are not necessary in small dairies.

In the winter season butter may be slightly coloured by a special preparation of annatto, or sometimes by the use of the liquid from scraped carrots. The milk from Channel Islands cattle produces butter of a beautiful natural colour. The most scrupulous cleanliness in every particular, and neatness and attractiveness in packing and preparing butter for market, are desirable. In this latter

particular French butter is generally in advance of our native produce.

The use of salt in what is sold as fresh butter is a matter of taste. In Scotland "fresh" butter is generally altogether free from salt. A small quantity is generally added to what is sold as fresh butter in the Southern Counties; and in the Northern half of England "fresh" butter is generally rather heavily salted. This we think a mistake, as it overpowers the flavour of good butter, and is quite unnecessary to secure its keeping as long as it is generally required. The process of making butter not required for immediate consumption, is the same as that above described, the butter being salted regularly with about half an ounce of fine salt per pound of butter, and the butter, pressed down tight in a clean jar or firkin, and covered over with a little salt and a thin cloth. The finest flavoured butter may be made from cows fed on good sweet grass in the spring or summer season. The use of some meal or some kinds of cake, whilst increasing the yield does not injure the quality. Linseed cake is somewhat objectionable.

CHAPTER III.

BREEDS AND MANAGEMENT OF FARM HORSES.

History. European Horses—Stud Book—*Breeds* : Suffolk—Cleveland Bay—Clydesdale—Shire Horse—*Breeding* : Rearing—Breaking—Feeding—Rations—Liability to Disease—Working—*The Stable* : Construction—Ventilation.

OF the first domestication of the horse—his first subjection to the service of man—all trace is lost. The records of sacred history, and the representations found on the tombs and monuments of Egypt and Assyria point to these events as coeval with the origin of man himself. The horse was numerous in most Eastern countries at an early age of the world's history. Conjecture points to Asia as his birthplace. Probably Egypt was the first country which made any attempt to improve the race, as we read of the rulers and princes of distant lands resorting thither to replenish their studs.

No horses were found either in America or Australia when those continents were first discovered. Now, on the almost boundless prairies of South America, immense herds, numbering many thousands, are to be met with. These mustangs, or wild horses, are the descendants of a race of Spanish horses, who escaped from domestication. On becoming emancipated they bred and congregated in herds. In time they became inured to exposure and the dangers and

vicissitudes of a nomadic life, preferring unimpeded freedom of action, with its attendant privations, to servitude and domestication with its advantages.

The horse is now to be met with in every habitable country; except Lapland and Greenland, in the region of eternal snow. The earliest records of this country refer to its horses. When Julius Cæsar landed his armies on the shores of Kent, he was opposed by armies—consisting in part of cavalry.

The horses of Europe, like the inhabitants, are of mixed lineage. The Russian horse is of small stature, hardy, and muscular, capable of great endurance, inured by exposure to the hardship of a rigorous climate, and the privations of an innutritious and scanty fare. The Italian horses of the present day are widely diversified in character; many are powerful and well-shaped, whilst others are of a light and weedy character. During the middle ages large numbers were imported into this country for military purposes, and no doubt became mixed with the native races. The Spanish horse is small, and has a strong dash of African blood. For many years large numbers of Norman-French horses have been imported into London, and into the provincial towns. They are compactly built, with fine crests; they are, however, generally rather sluggish in their movements, with shelly hoofs, and subject to side-bones and contracted feet.

The first Stud Book published in England bears date the 25th day of March, 1808, the second volume of which did not appear until 1822. During the fourteen years which elapsed between the appearance of the first and second volumes, the "horses" of 1808 had become "racehorses" in 1822. From this slender beginning all the Stud and

Herd Books now extant trace their origin. From the date of the Roman invasion the native race of English horses became much mixed in blood from a small Eastern breed supplied to them principally through the medium of Jewish dealers. The Anglo-Saxon warriors preferred the powerful black race of Germany, as representative of the Flemish breed. The Normans, who were skilled horsemen, imported the best animals their country could produce for the use of their soldiers. And as all horses used for war purposes during the middle ages were entire, they rapidly influenced the native breed of the country.

The horse was so important an agent in warfare as to induce the English kings, at great cost and trouble, to use every means in their power to effect their improvement. Henry II., King John, Edward II., and Edward III., each imported large numbers of powerful foreign horses for the improvement of the native races ; and from these descended the ponderous and somewhat sluggish race of the midland counties.

Although the indigenous breed of middle England differed somewhat in size from those of the lowlands of Scotland, yet the improvement of both was derived from a common ancestry. Both the improved Clydesdale and the modern Shire horses were built up through the infusion of Flemish blood. During the latter part of the thirteenth and early part of the fourteenth centuries a considerable trade was carried on between Scotland and the low countries, and in those days of barter it is only fair to suppose that the Scottish merchants would sometimes accept horses in exchange for goods.

It is generally considered that the later improvement of draught horses in England was principally effected through

the importation of a race of black horses from Holland and Belgium. Bakewell, of Dishley, whose name is a household word amongst the stock breeders of the midland counties, by his improvement of the Leicester sheep, also tried his hand on the improvement of the cart-horse. His efforts resulted in a considerable degree of success. He made several journeys to Holland for the purpose of selecting mares, which he imported to his farm at Dishley, crossing them with the old black horse of the shires. The stallions bred from this union subsequently became in high repute. Oil paintings of some of Bakewell's favourite stallions still adorn the walls of many a farmhouse in North Leicestershire.

The most natural method of reducing the horse to a state of subjection, is to teach him to bear the burden of a rider. It is within a comparatively recent date that the use of wheel carriages became general on the farm ; prior to this all the hay, corn, and manure was carried on the backs of horses : the latter in creels, or panniers, specially constructed for the purpose. A century ago, when excise duties were exorbitant on the luxuries, and even on the necessities of life, a very considerable contraband trade was thus constantly being carried on and the smuggled commodities were conveyed from the seaboard to the interior on the backs of horses. The class of animals used for the purpose seldom exceeded 15 hands ; they were remarkably well-shaped, strong, active, and sure-footed. Their invariable custom, when on the march, was to proceed in single file, only the first carrying a rider to direct the cavalcade ; each horse was securely tied to the tail of the one immediately in front of him ; the whole was under the escort of a few well-mounted men. But

the old pack horse, with all his valuable qualifications, has merged in other races, and become extinct as a separate breed.

Breeds.—The *Suffolk Punch* is chiefly confined to the Eastern Counties—Suffolk, Essex, and Norfolk. The breed is distinguished by the colour, which is chestnut, often merging into a dark sorrel, the mane and tail being frequently of a light or silvery shade. They seldom exceed 16 hands in height. The breed has been vastly improved within the last 20 years. They are compact and well shaped, legs tolerably free from hair, but rather inclined to be round in the bone. They are active, and well adapted for ploughing and other farm work. Many find their way to London, where they are used in brewers' drays and other heavy work. They are generally reputed as being trustworthy at a steady pull, at which they will again and again renew their exertions. They are reputed to be of Norman-French origin, and are said to have been at first introduced into the Eastern Counties by Norman invaders. Crossing with other varieties has been tried, but the result has generally been disappointing. The pure breed, except on the home farms of noblemen and large landed proprietors, has not, however, made much progress beyond its native district. Within the last few years there has been a growing demand for good specimens for importation; these have frequently realised high prices. The establishment of a *Stud Book*, and the fostering care of a vigilant executive, will tend to improve and enhance the value of the breed.

The Cleveland Bay may be considered more of a carriage than an agricultural horse. The breed takes its

name from the rich valley of Cleveland on the River Tees, in the North Riding of the county of York ; and it is now largely cultivated throughout Yorkshire, Durham, and Northumberland. The prevailing and most fashionable colour is bay, with black legs. Many are 16 hands and upwards. They are particularly active, hardy, and of great endurance. For general tillage purposes, on light soils they cannot be surpassed. It is generally supposed the breed was established by mating the blood horse with the native mares of the district. By still crossing the Cleveland mares with the thoroughbred, most of the fine carriage horses in the country are produced. Those with more bone and strength, though somewhat deficient in style and action, are in great demand in London and the large provincial towns, for spring carts and light vans, used in the speedy dispatch of merchandise. The thoroughbred stallion and the Cleveland mare form a good alliance, and many valuable weight-carrying hunters are now thus bred in these days. But a weight carrier is of little use unless he can go at a racing pace for a burst of 20 minutes, and successive crosses of pure blood are needed to increase the powers of speed and endurance. When carried too far, substance and strength are at length sacrificed.

The Clydesdale.—This breed derives its name from a district of considerable extent, through which the river Clyde winds its course. Taking Glasgow as a centre the country, for miles in every direction, is teeming with an industrial population. The haughs of Clyde are celebrated far and wide for the superior excellence of their pastures ; and here the breed has long been located, and then fostered and improved through the energy and intelligence of those

interested and engaged in the business of agriculture. No district can vie with that of Clydesdale in the care bestowed on the breeding, rearing, and management of the horse, and the labour has not proved unfruitful to those interested in the noble animal. A visit to the Glasgow Stallion Show will well repay the student. The ducal palace of Hamilton is situated on one of the middle reaches of the Clyde ; and a long line of noble proprietors have thence for centuries interested themselves in the endeavour to improve their favourite breed. A local tradition still lingers in the locality, that a certain duke of that ilk, centuries ago, imported several black stallions from Holland, which were used on the native mares. Hence the origin of the present improved breed. From a single centre the improvement has radiated to the most remote corners of Scotland ; and many fine animals are now bred in Ayrshire and the adjoining counties of Wigton, Kirkcudbright, and Dumfries. The head-quarters of the breed still, however, remain on the banks of the Clyde. The prevailing colours of the breed are black, brown, and bay. A grey sometimes makes its appearance ; but a stallion of that colour, however perfect in form, would scarcely be used for stud purposes. The average stature is about 16 hands ; they are rather long in the body. In the best specimens the head is lean, eyes full and prominent, neck well arched, and of moderate length ; shoulders oblique, chest wide, legs placed well outside the body, flat and muscular, with abundance of straight, soft, silky, feathering ; ribs deep and well-sprung, hocks clean and strong. One of the chief essentials in a draught horse is freedom of action. In this respect the Clydesdales are superior to most other breeds ; they step out freely

with the long, slinging gait peculiar to the race. They are high-mettled ; and, except from the results of neglect and unkind treatment, are usually free from vice. When used in one-horse carts, as they generally are throughout Scotland, no other breed of horses can accomplish an equal amount of work in a given time. The breed is held in high estimation, and commands high prices. During recent years the sum of £1600 has been paid for a stallion, whilst several mares have realised over £500 each. Through the united exertions of a number of patriotic noblemen and gentlemen interested in the breed, a society has been formed for the purpose of protecting the interests of breeders and purchasers, by means of a *Stud Book*, in which all animals of authentic pedigree can be registered at a small cost. This will no doubt greatly enhance their value, and enable the intelligent breeder to pursue his vocation with greater certainty of success.

The Shire Horse.—Ancient tradition accords to the rich fen land districts of Lincoln, Huntingdon, and Cambridge a distinct race of black horses, of tall stature and massive form. Animals of similar characteristic type, though varying in size (the probable result of a change of soil and climate), were spread over the counties of Northampton, Warwick, Stafford, Leicester, Derby, and Nottingham. Early historical records furnish descriptive particulars of a similar breed inhabiting Germany, Holland, and Belgium. They were well known and extensively used by the Romans for military purposes, during the Roman invasion and occupation, no doubt, large numbers were brought over to England, and became mixed with the native races. The breed appears to

have thriven best in a country of rank pasture and soft, marshy soil.

The old English black horse was a heavy, coarse animal, with wide loin, powerful quarters, and immense bone, generally inclined to be round, with flowing mane and tail, the legs clothed with a profusion of coarse hair. Their colour was generally of a sooty black, with almost invariably white markings on the legs and a small white star on the forehead. They were of a sluggish temperament. Their short, steep pasterns and upright shoulders were fatal to that freedom of action so desirable a quality in modern draught horses. Tradition says an Earl of Huntingdon imported several stallions from Holland for the use of his numerous tenantry on Trent-side. Down to the present day a similar race is still in existence in Holland, whence most of the horses used in mourning coaches are chiefly drawn.

The old English cart-horse, with all his defects, has been the basis of the most valuable breed of draught animals in England. From him has descended the Shire horse, good specimens of which are in great demand for waggon and dray purposes, both in London and the provincial towns, and the mares just now command high prices for breeding purposes. Many of the best mares and fillies go to Scotland, where they breed well with the Clydesdales. They are chiefly bred in the counties of Cambridge, Huntingdon, Northampton, Warwick, Stafford, Leicester, Derby, Nottingham, and Lincoln. Though not of such massive proportions as those reared in the Fen district, there are none more hardy, or of more pure descent, than are to be found in North Leicester and Derbyshire. The land being principally in old pastures, the mares are never

overworked, whilst the rich alluvial soils of the river valleys are specially adapted for the rearing of young horses. The fillies mostly go into the hands of breeders. The colts are bought young by the dealers, and passed on to the tillage farmers of the southern and eastern counties, who break them in and work them lightly till they are 5 years old, at which age they usually sell them to the great brewers and carmen. Great interest is now being taken in the cultivation and improvement of the breed, many wealthy noblemen and gentlemen are devoting great energy to breeding, the Duke of Westminster, the Earl of Ellesmere, Earl Spencer, the Hon. E. K. W. Coke have all large breeding establishments ; whilst of tenant-farmers Messrs. F. Street, Matthews, Nix, and many others are exerting themselves in the same direction. A society has been formed for the purpose of registering pedigrees. This will undoubtedly give a great impetus to breeding, whilst an authentic record will tend to enhance the value of the stock, more care will now be devoted to the selection of sires. Black, brown, and bay are the most desirable colours. This, however, to a casual observer, may appear a trifling matter, and, as the old adage runs—"a good horse never was a bad colour."

In the improved Shire horse the head is generally long and lean, the profile slightly arched, broad between the eyes, eyes large and prominent, ears large, not set too forward ; nostrils wide and clear ; neck long, deep, and arched ; shoulders oblique, sprung well into the back, deep from withers to shoulder point, and placed well outside the trunk—this ensures a wide chest, a most desirable and important point—ribs deep and well sprung, with small space between last rib and the hip ; round in the

barrel and deep in the girth ; back short, loins broad and muscular, long from hip to hough ; tail well set, buttocks full, dropping well down to hock. The feet should be rather large, the heels well expanded, the horny substance firm, slightly sloping, and free from sand cracks, side or ring bones ; legs short from knee to pastern, bone large and flat, well clothed with long silky feather, with tassel of hair at lip, knee, and hough ; pastern joints long and sloping. The carriage should be good, and the action long and slinging. Walking is the principal pace of a draught horse ; unless he can do this well he is of little use. Pace to some extent may be improved, but without good shoulders no animal can walk well.

Breeding.—The breeding of draught horses has hitherto been carried on under unfavourable circumstances, owing to the want of an authentic record of the pedigree of the different animals. The most intelligent and experienced have thus been in no better position than the careless or the ignorant man, who uses the first horse he can meet, provided the service fee be low, depending entirely on chance for the result. Whereas, it requires the guidance of a master mind to make success even a probability. Experienced breeders in every line are unanimously of opinion that extreme crossing, *i.e.*, coupling animals characterised by extreme differences, whether of size or character, seldom answers. What the Americans call line breeding is most to be depended upon. If any degree of success is to be attained it is of the utmost importance that great care and attention should be bestowed on the selection of the mare ; the excellence of the progeny depends on the good points more of the dam than of the

sire, though it is very desirable that both should be as perfect as possible. Both sire and dam should be young, in good health, and in full vigour. Great attention should be paid to soundness; it is idle to expect sound and healthy issue from diseased and unsound parents. Most of the infirmities from which cart-horses suffer are hereditary, and are certain to be transmitted from parent to offspring. Sidebones, which are very prevalent, are the result of careless breeding.

The produce of young mares are the most healthy and vigorous; there can be no greater error than that of putting a mare to the stud when she is incapacitated for work, either from age or accident. The mare may be put to the stud when only two years old, and if well cared for will not be injuriously affected. There is no more danger attending parturition in the case of young mares than there is in that of comparatively old ones. The period of gestation in the mare varies from ten to twelve months. It is desirable that she should be well kept during her state of pregnancy. Scanty fare and insufficient nourishment induce a debilitated condition, which sometimes causes abortion, and in any case must injuriously affect the progeny. A liberal supply of nutritious food, and a moderate amount of work or exercise, is essential to the health of every pregnant animal. In-foal mares, if carefully tended, may be safely worked up to within a short period of foaling.

The premonitory symptoms of parturition are a waxey adhesive secretion issuing from, and forming small drops or accumulations on the ends of the teats. This generally takes place about twenty-four hours before foaling. There is always considerable danger attending parturition; and

this is particularly the case where the mares are in high condition, and have had little work. False presentations will also frequently occur. As soon as the slightest premonitory symptom appears they should be closely watched; if the least difficulty presents itself the services of a well-qualified veterinary surgeon should at once be secured. We have frequently known mares subjected to great suffering, and even the lives of valuable animals sacrificed through the ill-directed efforts of unskilled persons.

When parturition has been safely accomplished the umbilical cord should be broken off, and the attachment secured. The foal should then be assisted to suck. This often requires the exercise both of skill and patience. Many foals are lost through neglect. The mare and foal should be kept in for a few days, and should at first be turned out only for an hour or two about noon, until they become hardened, and so to speak acclimatised. A few boiled roots and bran mashes should at first be given for the purpose of encouraging the flow of milk. If the weather is wet and stormy mare and foal should be taken into a yard during the night. The effects of every change of food should be carefully watched—a sudden change from dry to succulent food often produces diarrhoea in the foal, and if not speedily checked may prove fatal.

Horse breeding does not answer where the mares are worked hard while suckling. On tillage farms, where a large breadth of roots is grown and the whole team hard worked, however well they may be cared for, the strength and constitution of the mares is impaired and the foal is stunted, as they often remain four or five hours at a stretch without food. On farms principally in grass where the services of the mares are only occasionally re-

quired and the work is light, these remarks do not apply. Foals are generally weaned at from five to six months old. They are often removed to a separate pasture, or the mare is put to work. We very much prefer placing the foal in a loose box when first removed from the mare. Horses are social animals, particularly young horses. They thrive best when in the society of others, hence the advantage of placing several together. No doubt young animals thrive best in well-sheltered paddocks, furnished with loose boxes and yards. Foals should never be grazed on short pastures; if so, they invariably suffer from worms. During the early stages of their existence their diet should be principally composed of a mixture of crushed oats, Indian corn, and bran, with a few pulped swedes. Carrots are often recommended; but except in small quantities, they are injurious, as they excite the kidneys to undue action.

Bearing.—The land best adapted for the rearing of young horses is the soft alluvial soil of the river valleys, which throws up a profusion of grass, often of a coarse character; these spongy pastures tend to encourage the growth and expansion of the hoof. Only a very few horses are grazed on the best ox pastures of the midlands; graziers object to them, as they are apt to disturb the cattle. They settle best when only two are allowed to occupy the same field; they are useful to clear off the tussocks or rough bunches which the cattle sometimes refuse to eat. Horses are bad grazers when kept in large numbers on the same field; they generally choose particular spots, which they will gnaw off to the roots, whilst other parts are left untouched. Where horse breeding is carried out to any extent,

shelter sheds should be erected in the different fields ; and unless the grass land is of first-rate quality, a small allowance of oats or artificial food should be given daily, say 4 lb. or 5 lb. per diem of a mixture of crushed oats and bran, at a cost of about 2s. per week. This would increase the formation of bone and muscle, and would greatly enhance the value of the animal. In the case of foals, we greatly prefer wintering them in well-sheltered hovels, with large roomy yards, to admit of free exercise, which is of the first importance. Want of exercise retards the healthy development of bone and muscle, and when carried to an undue extent, even injuriously affects the general health of the animal. The artificial foods used for young horses should be rich in flesh-formers—clover, hay, beans, peas, oats, and linseed cake. A few cut swedes daily aid digestion, and tend to maintain the general health. Regularity in feeding is an important point. Compared with the bulk of the animal itself, the stomach of the horse is small, hence it should be frequently replenished. Long fasts produce flatulency and indigestion. We prefer using the food in a prepared state—corn ground, hay chaffed, and roots pulped. By this system a great waste of food is prevented. Except under vigilant and skilful management, however, it is attended with greater risk ; for, unless the food is all mixed together and well macerated with water before being used, it frequently produces a stoppage : the animal technically becomes “ bound,” which often proves fatal. In the absence of a veterinary surgeon we have frequently given the patient in such a case a quart of yeast with good effect. The feet of the young animal should be frequently examined and attended to. When turned out to grass the second year the pasture should afford a full bite,

and the land on which they are grazed should be of good quality.

Breaking.—The education of the horse should commence at birth; the foal from its earliest infancy should be accustomed to be haltered and to be led. If suffered to grow up in a half wild state to the age of two or three years—the first attempt at handling being made at this age, the young inexperienced animal is seized with a nervous dread of man. Its confidence can only be secured by the most kind and gentle treatment. Young horses should never be entrusted to the hands of men of hasty and ungovernable tempers. It is true certain vices may be transmitted from parent to offspring, but they are more frequently the result of ignorant and barbarous treatment. Instead of rational and gentle means, the most violent and cruel measures are often resorted to, with the ignorant view of effecting their subjection. This invariably results in disappointment and failure; the horse, possessed of great intelligence, is not slow to resent an injury. It is also capable of forming strong attachments. Nearly all the vicious habits of the horse are acquired through the gross negligence and unkind treatment to which they are subjected by their keepers.

The colt is usually put in the plough by the side of a steady old horse for a few days. On large farms where many young horses are used it is preferable as soon as they have settled down to work to place those of the same age in pairs; they thus become accustomed to step together, and are much more active than when retarded in their pace by the slow action of an old horse. Assuming that the legs and shoulders are well placed, the pace of an

agricultural horse much depends on the driver ; a man of sluggish habits soon brings his horses to his own pace. When the young animal is first put into the cart or waggon, great caution should be exercised in order not to frighten him or make him nervous. Horses should be accustomed to plain headstalls instead of the barbarous gear generally in use, which contract the vision to a mere narrow space in front. The horse when habitually interested with the sights around him, is less likely to take fright, and reasonable headgear may be the means of preventing many of the accidents which now daily occur.

As soon as the colt has been partially broken he should be taught to respect and obey his instructor, who should treat him with kindness and firmness, and in a caressing rather than in an angry tone. The harness should be quietly and carefully put on, and the horse led about, in order to accustom him to it ; he should then be put to plough between two steady animals ; gentle treatment will soon overcome his nervous fears. He should at first only be worked for a few hours daily, until he gets hardened and accustomed to the work. His shoulders are naturally tender ; they should be carefully examined each evening, and well bathed with strong brine for the first week or ten days.

Feeding.—The necessary quantity and quality of food vary with the age of the animals, and the relative amount of exertion they are destined to bear. In a natural state they subsist principally upon grass, cereals being beyond their reach. Even in a state of domestication the young animal frequently attains the age of three years before it receives any other food than that of grass, with occasionally a

small foddering of inferior hay. During severe weather in the winter months, a mixture of foods is given, relatively rich in heat producers, to restore the daily waste of tissue, and build up the animal system in a healthy state. Innutritious food overtaxes the digestive organs, and generally results in a stunted subject. Hay, oats, and beans, have an established reputation as the best food for the horse. This holds good where speed and endurance are the principal requisites, as in the case of the racehorse and the hunter. For slow work, such as that of the agricultural or dray horse, crushed Indian corn is now extensively used. Until the young animal has arrived at full maturity, we still prefer the use of oats and beans in moderate quantities. Greedy feeders swallow their food before it is sufficiently masticated; and the digestive organs are incapable of acting on the food in a crude state, and of extracting its nutritive qualities. Whether, therefore, the animals are young or old, and whatever the description of corn, it should all be crushed. In common with all other animals, slow feeding is of importance to the horse, as it increases the secretion of saliva, which passing into the stomach accelerates the process of digestion. The food of the horse should all be prepared and given in a concentrated form—the hay, or straw, or better still a mixture of both, should be cut into chaff and mixed with the crushed corn, and the mass macerated with water several hours before being used. Bruised corn given alone frequently induces scouring; we have known this to occur when the grain has been mixed with chaff. Wheat meal is sometimes used as food; but though nutritively rich, it is by no means a desirable food, as it has a natural tendency to form obstructions in the intestines. Barley is frequently

used ; but though rich in nutriment it is inferior to the oat. It is naturally of too heating a character, and animals fed upon it are subject to sudden attacks of an inflammatory character, and also to surfeit and mange. A full-sized agricultural horse at work on the farm will require 12 lb. of crushed oats and 30 lb. of hay chaff per diem. A better and cheaper food would be 9 lb. of Indian corn meal, 2 lb. of crushed beans or peas, and 2 lb. of bran per day together with the hay.* If tied up in stalls they will require 12 lb. of wheat straw per day for litter.

Horses are remarkably fond of raw potatoes. Their use is principally confined to the potato growing districts of the North, where they are largely used in a boiled state, being then considered more nutritious. Swede turnips are a wholesome and valuable addition to the bill of fare ; they are easy of digestion, and maintain the system in a healthy state ; in the south-western counties of Scotland they are extensively used in a boiled state mixed with chaff, and given whilst hot. Carrots in small quantities are valuable in conjunction with dry food ; though much relished, their use in large quantities is not desirable. As spring advances a change from dry to green succulent food exercises a beneficial effect on the health of the animal ; but the change from one extreme to the other, should be gradually accomplished. Rye, tares, clover, and Italian rye-grass, are the earliest and best varieties of green food ; they should be mixed with hay, or straw, and passed through the chaff-cutter. Except in the case of breeding mares and young stock, work horses are better and more cheaply summered in the yards ; a less quantity

* See Appendix.

of food then suffices, the animals rest better; and they thus escape the deteriorating effects of unrestrained freedom.

The most economical and wholesome food for an agricultural horse in full work is a mixture of Indian meal, bran, swedes, and cut chaff, one-third hay to two-thirds straw. This mass should be prepared, watered, and carefully mixed at least one day before being used. The ordinary weekly allowance is 60 lbs. Indian meal, 20 lbs. bran, and 120 lbs. chaff. During the winter months, if roots are plentiful, 6 to 10 lbs. of sliced or pulped swedes may be given with advantage. Regularity in feeding and watering is of almost as great importance as the food itself. Long fasts are most injurious to the health of the horse. When the work is of such pressing necessity as not to admit of the animal being taken out and fed during the day, the use of the nosebag should be resorted to. Irregular feeding is the cause of many of the ailments to which the horse is liable. The system of turning working horses out to grass during the summer months is an unsatisfactory and expensive practice. On the majority of tillage farms there is generally abundance of straw. By the exercise of a little forethought a succession of green food, rye, tares, rye-grass, clover, and trifolium can be grown. The hard-worked horses kept in the yards will stand their work much better, and will convert a quantity of straw into valuable manure at a profit to the farmer. On all the best managed farms very little long hay is now used, nearly everything is passed through the chaff-cutter. Even oats are now seldom used in a whole state, they are generally passed through grinding mills. Used as a condiment a small quantity of malt is beneficial. Linseed

cake is too costly to enter into the daily bill of fare. Some further particulars on this subject are given in the Appendix.

Next to the quality of the food, the chief point which contributes to the health and comfort of the horse, is the regularity with which he is fed. This should be done at fixed intervals and these should be rigidly observed. As a rule, the food of the horse is quickly digested, hence the utility of frequent feeding: long fasts are apt to cause the horse to feed greedily, and are a frequent cause of indigestion, or stomach staggers. A lump of rock salt should be kept constantly in the manger, or in some other convenient place within the reach of the horse. Of no less importance is the quantity and quality of the water with which they are supplied. The horse, when in a heated state, is frequently injuriously affected when allowed to swallow a large quantity of water at a low temperature. The safest plan is to have a constant supply in a trough in the manger, to which they have free access at all times, where this is so we have never known any injury to arise. Here the natural sagacity of the animal is clearly shown, with the knowledge that it is at all times within his reach, he is careful not to take too much. There is considerable difference both in the temperature and quality of water. River or pond water, when tolerably free from organic impurities, is generally soft, palatable, and more conducive to health than that obtained from springs and deep wells, which is generally hard and cold, and charged with chemical elements contained in the rocks through which it flows. To a horse unaccustomed to it hard water induces chilliness and colic and a staring coat. All ponds or reservoirs for supplying stock should be fenced in, and kept

clear from weeds and decaying organic substances of all kinds; horses under a state of freedom naturally prefer soft water.—Reference to the cost and quantity of work accomplished by horse-power upon the farm will be found in the Appendix.

The Stable.—A well-constructed stable is of the utmost importance: farm stables have hitherto not received that amount of attention which their importance deserves. They should be erected on a dry situation, and be lofty and well ventilated. Stables with granaries over cannot be too strongly condemned. A free circulation of pure air is of vital importance. Ill-ventilated stables are hot-beds of disease. Poisonous gases are generated from the fermenting excrements; these become mixed with carbonic acid thrown off from the lungs in the act of respiration; and this vitiated pungent atmosphere is unavoidably again and again inhaled. This soon injuriously affects the lungs, impairs digestion, weakens the vital functions, induces attacks of chronic cough, inflammation of the eyes, ophthalmia, and numerous other ailments. The practical details of stable construction will be further explained when treating on the buildings of the farm.

CHAPTER IV.

BREEDS AND MANAGEMENT OF SHEEP.

Breeds: Lincolns—Cotswolds—Leicesters—Local Longwoolled Breeds—Cheviots—Mountain Breeds—South Downs—Hampshire Downs—Oxfordshire Downs—Shropshires. *The Ewe Flock:* Breeding—Early Fattening—Auction Marts—Lambing—Castration—Weaning—Shearing. *Fatting:* Early Maturity—Rations. *Diseases:* Rot—Foot-rot—Gid—Scour—Hoose—Splenic Diseases.

THE number of sheep in Great Britain is larger than on any other equal area, there being 28,157,080 in 1879, 26,619,050 in 1880, 24,581,055 in 1881, on 30,000,000 acres of cultivated and enclosed land, besides an indefinite extent of unenclosed moorland. The number and variety of improved breeds specially adapted to produce either fine close wool and mutton of the finest quality, or long wool and great weight of mutton is also remarkable. There is no other domestic animal upon which climatic influences are so great. Pure-bred animals, of any of the distinct English breeds, when removed to a locality where the soil and climate are quite different, will in the course of two or three generations gradually change their type. The quality of the wool is dependent upon the climate and soil, not less than upon the breed of sheep. Generally speaking, the native sheep of a district have special qualities, the result of climatic influences, which render them, when improved by careful selection and breeding, or

by crossing with some other strain, more profitable to keep in that district than any other breed. The natural home of the sheep is upon dry uplands, and though a limited number will for a time thrive admirably upon the succulent grass of low-lying pastures, they are apt to become affected with foot-rot, and to scour if kept thickly on the ground. After the terrible loss of cattle from rinderpest in Cheshire, many farmers stocked their dairy pastures heavily with sheep, not daring to purchase cattle. It was found, however, that they would not thrive upon such unsuitable land.

Breeds of Sheep.—Sheep may be divided into three classes—Longwools, Shortwools, and Mountain sheep.

Foremost among the Longwools stands the *Lincoln*, on account of the great weight and the lustrous character of its fleece. The large number of sheep kept in the county from which this breed derives its name are, with few exceptions, entirely of this breed, and many are also kept in all the adjoining counties. On the dry arable lands of Lincoln Heath and Wold, these sheep thrive admirably, receiving often in the summer and autumn somewhat dry and scanty pasturage on clover or stubbles, but in the winter being folded on turnips, with linseed, or cotton cake or corn, and other dry fodder. The native sheep of the district were originally crossed with the Leicester, and have been greatly improved. Whilst weight and quality of wool have been increased, weight of carcase, symmetry, aptitude to fatten, and early maturity, have also been improved. A large number of very fine fat sheep in the wool, 1 year old, are annually sold in April at Lincoln, and other fairs in the county. Lincoln wool is of very long

staple, and often curly, parting down the back. Some of it has a glossiness which is much prized, as it is retained when manufactured into various fabrics. Lustre wools were used for mixture in the manufacture of alpaca goods, and commanded a high price, which however has of course been dependent on the demands and freaks of fashion. Instances of a fleece weighing as much as 30 lb. are not wanting, and ram hogg fleeces in a flock often average 14 or 15 lb. each. The faces and legs of the Lincoln breed are always white.

The *Cotswolds*, perhaps the largest British breed of sheep, originally springing from the neighbourhood of the Cotswold hills, have been cultivated with care and improved in quality. They are for the most part confined to their native district, but some are kept in Norfolk; and the rams of this breed are often used with ewes of other breeds, specially Hampshire and South Downs, also North Country and Border Leicesters, to increase the size of the produce, and to get cross-bred sheep for fattening. Cotswold sheep have large handsome frames, well covered with flesh, and a great propensity to fatten. They handle soft, and the mutton is rather coarse-grained. They have the head well covered with a tuft of wool. The majority of the sheep have white faces and legs, though some pure-bred sheep are mottle-faced.

The *Leicester* breed of sheep has been cultivated more than 100 years, the name of Bakewell being very famous in connection with this breed in the last century. Enormous prices were then paid for the purchase or hire of the rams from his flock. The Leicester sheep is of moderate size, with neat frame, a good fleece of wool, very firm mutton, and a great aptitude to fatten. The mutton has

however, too large a proportion of fat, and is, therefore, not so saleable as the mutton of some other breeds. The price of fat for tallow now rules very low, less than half the price that was formerly paid, whilst prime mutton not over fat is much dearer than formerly. It is, therefore, now most profitable to breed sheep which have a good proportion of lean flesh. The pure-bred Leicester, possibly from close in-breeding, is now somewhat small and delicate looking. The head is small and often bare, the face white, the nose very narrow. Leicesters have been very useful for improving coarser breeds of sheep, and many of the local breeds of white-faced sheep which have a good dash of Leicester in their composition, are very profitable sheep in their special districts. The Teeswater, the Border Leicester (a much larger white-faced sheep, the most noted breeders of which in the north obtain enormous prices for their rams), the Derbyshire Limestone sheep, and the Devon Longwools, have most of them a heavy fleece, tolerable symmetry, and aptitude to fatten, and much more size and constitution than the pure Leicesters, from which they are partially derived. The Kent or Romney Marsh sheep are a hardy local breed, with a good growth of long, rather fine wool, rather unlevel frames, and faces resembling the Cheviot. All these breeds have been improved by crosses of the Leicester breed, by which they have been rendered more precocious, becoming earlier ripe, and more symmetrical, with better backs and loins and legs of mutton; while not necessarily losing hardiness or local fitness. The low prices recently obtainable for wool, and specially for long wool, due to the greatly increased import of long wool from the Colonies, the produce of native breeds crossed with long woolled

rams imported from England, have somewhat discouraged the breeding of our heaviest wool producing races.

The *Cheviot* is a very useful whitefaced sheep, bred in hilly and upland districts in Scotland and the North of England, where the pasturage is moderately good. The ewes are remarkably good sucklers; when three years old they are generally sold from their breeding districts, and are purchased for grass farms for breeding, by a Leicester ram, one crop of lambs for sale to the butcher, either as fat lambs or yearlings; the ewes themselves being fattened after rearing their lambs. Cheviots have not a heavy fleece; their mutton is excellent, and the first cross Cheviot and Leicester is specially good for fattening, and many Scotch farmers keep these cross-bred ewes for breeding purposes. When put to a Shropshire ram their progeny is admirably adapted for sale to the butcher either as fat lambs or fat yearling sheep. Very large annual sales of cross-bred Cheviot and Leicester ewes are held in the autumn in the south of Scotland.

The Somerset or Dorset horned sheep, a whitefaced but scarcely a longwool breed, is specially useful for breeding early lambs for fattening as house lambs in the winter for the London market. The ewes will sometimes rear two crops of lambs in one year.

Black, brown, or greyfaced sheep are usually classed as Shortwools, though some of them, as the Shropshires and Oxford Downs, especially the latter, cut a good fleece of wool of long staple.

The *Southdown* is a brown or greyfaced sheep, rather small but very true in form, with very close fine wool, and mutton of the finest quality. Southdowns are largely kept in the dry climate of the south and south-east of

England, and thrive well on the close cropped herbage of the downs, furnishing the highest priced mutton for the London market. Removed to the colder and moister climate of the midlands or the north they prove thriving, and ultimately change their type.

The *Hampshire Downs* are much larger sheep, with more bone, short wool, lengthy frames, black faces, and often long Roman noses. This breed has been described by its admirers as "the coming race" of sheep; it undoubtedly possesses many merits. They are well adapted for folding on the light arable farms of Hampshire, and the wether lambs are sold fat from 8 to 14 months old, weighing 80lb. to 100lb. the carcase. They have recently been much improved in frame, quality, and early maturity. Their fine lengthy carcasses full of lean flesh are much esteemed in the London markets. Lambs of this breed attain a greater weight than those of any other breed at the same age.

The *Oxford Downs* are a fine breed of sheep, like the Shropshires of comparatively modern introduction. They were originally produced from a cross of Cotswolds with Hampshire Downs. They have been carefully bred as a distinct breed for more than thirty years. They have large, handsome frames, like the Cotswolds, but with a black or grey face, closer wool, and firmer mutton. They are largely kept in Oxford, Bedford, Bucks, and adjoining counties. The ewes are moderately prolific, and the young sheep fatten to a good weight at 12 to 15 months old, one of their chief merits being their size and maturity at an early age.

The *Shropshires*, more probably than any other breed, are being kept in increasing numbers over a wide district.

Like Shorthorn cattle they seem to possess the faculty of thriving in varied circumstances of soil, and climate. They occupy, to the exclusion of other breeds, continually extending areas, of which Shrewsbury, Stafford, and Birmingham and Worcester are centres. They are also kept in many other counties of England, and there are some good flocks in Ireland, Scotland, and Wales; and rams of this breed are in demand for crossing. With a good fleece of fine, thickset wool, and a well-covered head, a carcase long, wide, and deep, with plenty of lean flesh, they have robustness of constitution and aptitude to fatten. The quality of their mutton is excelled only by that of the South Downs, and possibly some of the smaller mountain breeds. The ewes are good sucklers and very prolific, 100 ewes not unfrequently rearing 160 to 180 lambs. The colour of the face and legs is black or grey. As Leicesters have been used for conferring symmetry and precociousness and fineness upon longwoolled breeds, so South Downs have been used at various times to give early ripening and diminished coarseness to our various shortwoolled breeds, which however like the Cotswolds, Lincolns, and Kentish breeds of sheep are now maintained in the acquired quality which further admits of imported blood.

Amongst the mountain sheep may be mentioned the Herdwicks, a large, hardy, horned sheep; the Blackfaced Scotch, the Lonk, the Exmoor, and the small Welsh sheep, which are very hardy, and have excellent mutton when well fattened, but are so small as to leave little profit to the feeder. Most of these sheep are bred in rather wild districts, and require little attention, a shepherd and his dog looking after 500 or 600 of them. They graze on the

heather and rough mountain grass, getting no extra food, except in severe weather. The wethers and draft ewes, when of mature age, are sold to be fattened in better pastures. The mutton of all these mountain breeds is excellent when well fattened.

Breeding Flocks.—Large breeding flocks of sheep can be most profitably kept on dry arable farms, for the most part of light soil, in those parts of England where the rainfall is light. They are also largely kept upon dry hilly grass farms. On purely arable farms sheep are kept in spring, summer, and autumn on the seeds grown in rotation every fourth or fifth year, with the addition of various fodder crops, such as winter and spring vetches, cabbages, rape, rye, or mustard, which are grown for them, and consumed on the land by close folding. In the winter, white turnips, swedes, or mangels, with the addition of cut straw or hay and some corn or cake, form their diet.

The consumption of roots and other green crops by sheep, upon the land where grown, in folds changed once or twice daily, thus manuring the land equally without expense of cartage, has been the foundation of great increase in the yield of corn crops upon light arable farms. On heavy arable farms in a damp climate, the consumption of roots by folding is not always possible without damage to both land and sheep from a muddy lair. Vetches, however, afford a summer fold on such lands where sheep are kept with advantage in the winter months either in sheds, or in yards partially covered. By the daily use of a moderate quantity of dry litter they may be kept clean and thriving. Their feet require careful attention to prevent foot-rot.

In a regular breeding flock the ewes are kept young ; all those above 3 or 4 years old being draughted and sold to produce one more crop of lambs on some farm where the ewes are bought every year, or fattened and sold to the butcher. There is less risk of loss with young ewes, and it is better to sell them before they are very old, and when they will realise a good price, and to supply their places with yearling ewes. In a ram breeding flock, any ewe of special excellence may be kept as long as she will breed. The age of sheep up to 4 years old is readily ascertained from the mouth. They put up two large teeth in the centre of the lower jaw, casting two sucking teeth at about 12 months old ; they put up two more large teeth each of the next three years, making at 4 years old a full mouth of eight large teeth. These soon become gappy and worn, especially when sheep are fed on whole roots, when sheep are said to be broken mouthed.—See last chapter on “Health and Age.”

The system of the early fattening of our improved breeds of sheep has gained ground. The earlier the process of fattening commences, and the sooner it is over, the greater the economy in the consumption of food, although it may have to be of a richer and more expensive character. A very large number of sheep, which formerly would have been kept until 2 years old, are now sold fat at 12 to 14 months old at nearly the same weight. The price of mutton of the best quality suffers less than any other agricultural commodity from foreign competition. The giving corn or cake in the summer, cutting the roots for young fatting sheep, and giving a larger proportion of dry food with turnips or other watery food, are all modern improvements in the feeding of sheep.

The establishment of auction marts for the weekly or fortnightly disposal of fat and store stock has become very general in our agricultural towns. A large number of sheep change hands about Michaelmas, many being then sold from grass-land farms to be folded upon turnips, and the price obtained for them is greatly dependent upon the turnip crop. The sales of rams of all the improved breeds of sheep are annually held in August or September, and prices of £10 to even £100 occasionally are obtained for well-bred animals of good fleece and carcase. The time of putting the ram to the flock varies with the locality and the prospects of early spring feed. In the South of England August and September are usual months. In the Midlands October, and in the North, November. Where rams are bred for sale for stock purposes, it is contrived to have them early, so that they may be large shearlings. As one ram is serviceable for 50 or more ewes, it is good policy to secure a first-rate animal of the desired quality, although a good price may have to be paid. The ram is usually turned with the ewes, but in special cases, where it is desired to put a large number of ewes to a valuable sire, the ewes when in season are brought to the ram. In a regular breeding flock the plan of crossing by using a ram of a different breed is rarely adopted, as the progeny, though good for feeding, would be undesirable breeding animals.

Breeding ewes are better in moderate store condition, not fat, and when the ram is put with them they should be improving in condition. A supply of succulent food at this period is found to increase the number of lambs. For this reason many good managers provide a fold of rape or early turnips for them at this season. As an

instance of the powerful influence treatment of this kind has upon the yield of lambs, we may mention the case which came to our knowledge of a Scotch farmer who, from a very large flock of Cheviot and Leicester ewes served by a Shropshire ram, reared and sold fat to the butcher, at £2 each, more than two lambs for every ewe. Many roots are not desirable for in-lamb ewes, and they are generally kept on the stubbles, clover, or grass, with a few roots and some dry food, or they follow the fold of the young and fatting sheep, clearing up the waste roots, and being supplied with ample dry food. On farms where there is any sound grass land not liable to sheep-rot available ewes may well be kept in the winter upon it, with perhaps a little cotton cake or a few roots, as they approach lambing. Ewes go with lamb from 20 to 22 weeks, young ewes yeanning rather sooner than old ones. In a large flock of ewes some healthy lambs will generally be dropped alive at 20 weeks and 3 days after the date of the ram being turned to them. When near lambing, ewes require rather better keep, avoiding on the one hand the extra risk of inflammation and parturient fever, which arises from ewes being in too high condition; and, on the other hand, feeding the in-lamb ewes so that they may produce their lambs strong, and may be able to suckle them well. In flocks of ewes, such as the Shropshires, some of which will produce three or more at a birth, it is desirable to draw out all ewes very heavy in lamb or weakly some time before lambing, and to feed them more liberally than the rest of the flock, giving them 1 lb. each daily of linseed cake or oats with good hay and roots, and driving them as little as possible. After lambing, all ewes require liberal feeding, so as to yield an abundant supply of milk

to the lamb, the want of which injures the constitution of the lamb ; and no amount of good food supplied later in life can compensate for the loss of it. On arable farms, early rye or Italian rye-grass is provided for early spring feed, in addition to roots, and a half a pound to 1 lb. daily of cake or corn. In the milder climate of the South of England cabbage or thousand-headed kale is successfully grown for use at this season, but severe winters injure these crops, and in colder districts they rarely stand the winter well.

When about to lamb the ewes are brought at night or in very bad weather into a covered shed or yard ; or a movable lambing shed is taken into the open field ; and protection against wind and rain is provided by means of hurdles wattled with straw, or by padded fencing of some other kind ; and the shepherd gives them unremitting attention both by day and night. In the majority of cases ewes will yeave their lambs without assistance, and are best left without interference, except to see that the lamb sucks all right. In any case of false presentation help should be carefully given, and after any case of difficulty an intelligent shepherd will apply simple remedies such as those recommended by Mr. Woods in his pamphlet on sheep. Sometimes great mortality occurs amongst ewes within two or three days after lambing, from inflammatory fever, which, where sheep are kept in large numbers together, may become highly infectious. From one to three days after lambing the ewe droops, and then after-pains begin. The use of dilute carbolic acid applied to the womb has been found very beneficial in these cases. One part of Calvert's best carbolic acid to seven parts of Gallipoli oil

is a suitable strength for use, about two tablespoonfuls being poured into the womb. Mr. C. Scott, of Howford, near Kelso, in a letter to Mr. Woods, has brought this remedy into public notice. And its merits have been amply verified since. Separation of such cases from healthy ewes about lambing should always be carried out.

A supply of cow's milk should also be at the disposal of the shepherd, as although it is not so suitable as ewe's milk, and its use is attended with some risk to the lamb, yet in the numerous cases in which for the first few days ewes have not sufficient milk for their lambs, it is the only means of keeping them alive. Young lambs require some shelter in very bad weather, but it is not well to keep them long confined. The lambs in a short time begin to nibble food for themselves; and where ewes are fed in troughs with cake they will soon learn to eat a little. On arable farms where the ewes are folded, the lambs are frequently permitted to run before the ewes by means of special hurdles. Their early growth is much forwarded by a variety of succulent or concentrated food. Nowhere is this better carried out, than in Hampshire and other counties in the South of England. The use of a small quantity of malt or of malt-combs, is, often attended with advantage, being highly relished by the young sheep, and having a condimental value apart from its mere value as food.

Castration of all ram lambs, not likely to be required for stock purposes or to be sold to the butcher as early lamb, may be performed by drawing at about a week old, or if delayed to eight or ten weeks old, by searing. There is usually little danger in either of these plans, though

sometimes from the weather being very cold at the time of operation, or some other cause, loss does occur. Where drawing is adopted it is much safer done early, the lambs being afterwards housed a night or two if the weather be frosty or cold. It is claimed for the searing process that the lamb is stronger for being cut late, and when sold as a fat wether has a better developed purse.

Weaning is better not delayed too long, especially if the lambs have learned to eat corn or cake, and there is a good supply of suitable green food for them. About three months is the usual age. Where the sheep are kept within hurdles an easy plan of separation is to shut the lambs forward by a double row of hurdles, when they soon become reconciled to the change. Lambs should be dipped as soon as weaned, not only in order to destroy all vermin which disturb and injure the growth of the lamb, but to prevent the fly striking them in hot weather. The ewes and yearling sheep are also commonly dipped after they have been shorn a few weeks ; and some flockowners dip a second time in August or September. Various dipping compositions are employed which are effectual, arsenic being an ingredient in some of them ; but with ordinary care and attention to the directions given by the makers of these dips, there is no risk. Special apparatus can be obtained very convenient for dipping and draining the sheep, or two large tubs may be employed. Carbolic preparations are preferred by some.

Shearing is usually done in May, many fat hoggets being shorn much earlier, just before going to the butcher. The time, however, varies greatly in different parts of Great Britain according to the climate. The sheep should

be washed ten days or a fortnight previously, time being allowed for the yolk of the wool, an oily secretion, to rise in the fleece. Washing may either be done in a running stream, or in a tub with warm water, in which a little soft soap has been dissolved, the sheep being afterwards rinsed with clean water. The latter plan takes more time, but is more effectual. Unless sheep be well-washed the value of the wool is much lessened. Shearing is often done by men who go round various farms; 5s. per score being a common price. Sheep shearing machines have latterly been invented which will do the work, but not, as yet, with any economical advantage. If the weather be windy and wet or very cold, newly-shorn sheep require housing for a few nights. Great losses have sometimes occurred through too early exposure.

In districts where the maggot fly is troublesome the sheep are often dressed over their backs with some powder to prevent the fly striking. Careful shepherding is required in hot or showery weather, and any sheep becoming dirty at the tail should be at once clipped clean (belted), or damage to the wool and the sheep from the maggot will arise.

Feeding.—The larger improved breeds of sheep, such as, Longwools, the Lincoln, the Cotswold, and the Border Leicester; and amongst Shortwools, the Hampshire, the Oxford, and the Shropshire, may be readily fattened to an average weight of 90 lb. the carcase at 13 months old, if, in addition to an abundant supply of other food, they are supplied as lambs, before and after weaning, with a small quantity of cake or corn, at a cost of 2d. per head per week, being also given 1 lb. per head daily of mixed cake and corn for the last six months, from October to April,

at a cost of 6*d.* per head per week; making the total cost of artificial food—

30 weeks at 2 <i>d.</i>	5 <i>s.</i> 0 <i>d.</i>
26 weeks at 6 <i>d.</i>	13 <i>s.</i> 0 <i>d.</i>
	18 <i>s.</i> 0 <i>d.</i>

The fat sheep will make from 10*d.* to 1*s.* per lb., either sold in the wool, or shorn and the value of the wool added, making for the carcase of 90 lb. from £3 15*s.* to £4 10*s.* It is difficult to give trustworthy data as to the quantity of roots, or other green food, required by a given number of sheep, so much depends upon the quantity of dry food used, and upon the size and kind of sheep. Morton's *Cyclopædia* states that a ewe living on roots alone will consume from 25 to 30 lb. daily. Supposing 100 sheep, having a small quantity of chaff supplied, consume 20 lb. each daily of turnips, a crop of 15 tons on 1 acre would last them nearly 17 days. Mr. Coleman, in his paper on "Sheep," in Royal Agricultural Society's *Journal*, vol. i., part 2, estimates that 1 acre of a crop of swedes, of 16 ton, will keep 300 tegs one week. Mr. A. Ruston estimates that 1 acre of mangels of average crop will, with some dry food, keep 25 tegs or 20 older sheep from the beginning of December to the beginning or middle of April. Mr. Lawes has found by experiment that sheep well fed under cover will consume about 70 lb. of roots, 4½ lb. of hay, and 4½ lb. of cake per head per week for every 100 lb. of their live weight, increasing in weight weekly about 2 per cent.

The Principal Diseases of sheep require some mention. The liver rot—due to the presence of the fluke in the liver and biliary ducts—destroys thousands of sheep every wet season, and wrought unprecedented

damage in the years 1879 and 1880, both of which were marked by excessive rainfall in the summer months. Sheep never acquire this disease except from feeding on land which, either from want of drainage, or excessive and continuous rainfall or flooding, has had stagnant water upon it. The history of the fluke worm, its various changes, and the probable means of its introduction into the system of the sheep, have been ably treated upon by Professor Simonds in a paper published in the Royal Agricultural Society's *Journal*, vol. 23, p. 64. Sheep in the first stage of this disease will fatten readily, and in some cases will live for years; but it is incurable, and it will generally be best to fatten as quickly as possible, and send to the butcher the whole flock, if this disease is found at all prevalent. It may be guarded against by careful stocking, by allowing the sheep to have free access to salt, by the use of extra foods, by draining wet marshy places in the pastures, and by not allowing sheep to graze upon land lately flooded or waterlogged from excessive downfall. The risk of acquiring this disease is much greater in the summer or autumn than in winter or early spring, as frost is believed to destroy the embryo. The sheep are, however, often some months before the mischief is apparent in them. When fattening sheep are purchased, especially after wet seasons, care should be taken to ascertain if they come from sound pastures, for careful inspection of their appearance as regards soundness is not sufficient, as it is not always possible to detect unsoundness in them by the most careful examination: and it has latterly been a common practice to ascertain the condition of any lot offered in the market by slaughtering one for examination.

Foot-rot is a very troublesome complaint with sheep kept on low-lying succulent pastures. Upon the dry uplands or light arable soils, for which sheep are specially fitted, it is rarely seen, and if introduced there, is speedily cured ; but upon rich cattle-feeding pastures it is very prevalent. Frequent parings of the hoof, and the dressing of the part affected with some caustic preparation, or carbolic acid, are the best modes of treatment. It sometimes becomes so thoroughly established in the system as to be incurable.

Upon some land lambs, when thickly kept, are affected similarly to calves with the hoose, due to the presence of worms in the bronchial tubes. A similar mode of treatment for its cure is adopted.

Young sheep are sometimes affected with what, from the symptoms observable, is called the turn, or the gid, a brain affection, due to the presence within the cavity of the skull of a hydatid of the tapeworm. If the young sheep be fleshy, they should be promptly slaughtered. The operation of piercing the skull and destroying the hydatid is, however, sometimes performed with safety.

Lambs are liable to suffer from scour, which is sometimes due to the presence of parasites in the stomach or intestines. It is dangerous to let them graze upon land which has been previously very heavily stocked by older sheep, and upon which the clover or grass has sprung up again in dark green luxuriance. Pasture land in high condition, the result of liberal manuring, or feeding stock with cake, is sometimes unsafe for young sheep, which in such circumstances sometimes suffer from a fatal kind of fever.

Feeding sheep, or ewes suckling lambs, are liable to be

seized with sudden inflammation, being often found dead without being previously seen to be amiss. The lungs in these cases are often found much congested, but sometimes the inflammation seizes the head or neck. These cases rarely recover, and with fat sheep prompt slaughter is generally resorted to if they are found to be amiss. Sheep are more liable to be thus taken when grazing upon very luxuriant clover or rape, or when first put upon turnips. These attacks of blood disease are of kindred nature to quarter-evil and splenic apoplexy in cattle, the causes and means of prevention of which are as yet but imperfectly understood. When corn of any description, but specially maize, is given to sheep unmixed with chaff or other food, there is risk of losses from some sheep eating voraciously more than their share. Sheep trespassing into corn, whether ripe or half ripe, or getting to the sides of a stack of loose corn, are in danger of over-gorging themselves with fatal results.

CHAPTER V.

BREEDS AND MANAGEMENT OF SWINE.

Breeds: Small White—Large White—Middle White—Suffolk—Essex—Berkshire—Dorset. *Management:* Farrowing—Feeding. *Diseases:* Fever—Murrain—Mange—Spleen—Inflammation.

THE agricultural returns show much greater variations in the number of pigs than in any other domesticated animals, the annual difference sometimes amounting to as much as 10 per cent. or more; the principal cause no doubt being the ease with which the swine of the country may be increased, from the early age at which they produce their young, and the number brought forth at each birth. The average number of swine in the United Kingdom is about 2,250,000.

Breeds.—Each county in England, and almost every district has a distinctive variety of pig, which has acquired a local reputation for some good or bad points; but we may consider the following as being the sources from which the different local varieties originate—viz., the Small, Middle, and Large White breeds, the Black Suffolk or Essex, the Berkshire, the Dorset and the Tamworth. There are besides these the black and white pigs of Northamptonshire and many others, which have not been so fortunate as to find some one to set about improving

them and fixing a certain type, as did the late Earl Ducie and others for small whites, and the late Mr. Fisher Hobbs, Mr. Sexton, and Mr. Stearn for the Suffolk or Essex breed.

The *Small White Breed* first demand a description as perhaps the most useful variety, not only for breeding as pure stock, but for crossing purposes; as it not only gives quality to the other breeds of white pigs, but has been successfully used on nearly all kinds. A cross between a boar of this breed and a Berkshire sow is said by some extensive pig-graziers and breeders to be the best for their purpose, the small white giving quality and aptitude to fatten, and the Berkshire leaner and firmer meat, as well as rather more weight.

The principal points of the small white breed are a short, upturned nose, lower jaws dished, prick ears, heavy jowls or cheeks, so that when fat it is an open question whether or not they have eyes, or whether the noses have undergone an operation of some kind to give them the broken appearance they then present; the neck somewhat long, and well padded with flesh, making the head appear to be hung at a lower level than the shoulders, which should be wide apart, and well joined to hoop-like ribs; the loin wide, the hind quarters long and square, with flesh down to the hocks; the tail very fine, the legs short, and placed well apart; the whole carcase covered with a coat of soft silky hair.

The *Large White Breed* are better adapted for breeding growing stores or as scavengers in the bullock-yards; they are fast growers, but require to be at least 12 months old before being put up to fat. They then reach an enormous weight; some have been known to reach as much as

60 stone imperial. The colour is generally all white, but the largest of the breed have sometimes blue spots or patches which the breeders do not object to, as they assert that it is indicative of great size. The principal points of the breed are a short square head with somewhat drooping ears, rather light in the neck, good shoulders, flat ribs; a long and rather narrow back, tail placed low, good hams, thick bristly coat, all placed on fairly long legs.

The *Middle Breed* at present have scarcely a fixed type of their own, but the specimens at our largest shows give one the idea that they are either a cross made to increase the size of the small breed, or one made to give the large breed more quality; the result being an animal too small for the latter and too large for the former breed, and yet a very good pig for general purposes, as some of the produce will be small quick grazers, whilst others will require more time and make heavy bacon pigs.

The *Black Suffolk or Essex* closely resemble the small white breed in their early maturity and other qualities, as well as in their shape, the principal differences being their coal-black skins, at times not too well covered with hair, their greater length and lighter carcass; the head, too, is not so short or dished. A great many of this breed, or of one very similar, are kept in Devonshire and Cornwall; the breeders from these counties sending some very good specimens to the Bath and West of England Society Show, as well as to their local shows.

The *Berkshires* have been bred and exhibited by tenant-farmers in larger numbers than any other breed. This is doubtless to a certain extent to be accounted for from the Berkshires being more hardy in their young state, and requiring at all stages of their life less care and

attention than any other improved breed. A great many have been exported to America, where they have been extensively used for crossing with the native stock, as well as for breeding pure breeds. Our American cousins are ahead of us, as usual, in having established a herd book for this breed. The demand for Berkshires is not now so great for exportation as it has been, both the Americans and Canadians preferring the white breeds. A proposal to establish a herd book for the small white breed is already on the point of being carried into execution. The points of a Berkshire are—black colour, a longish head slightly dished, ears thick and inclined forwards, a star on or a white mark down the forehead, white feet and tip end of the tail, neck muscular, shoulders wide, ribs flat, somewhat narrow loin and hind-quarters, drooping rump, bone of the legs thick and rather coarse, as is the coat, denoting hardihood rather than aptitude to fatten on little food.

The *Dorsets* seem to have claimed a place amongst the distinctive breeds of pigs from the success which has attended their exhibition at the Smithfield Club. They appear to be derived from a cross between the Suffolk and Chinese, or Neapolitan breeds, which has produced a somewhat plain animal of a rusty colour, longish head, rather pendant ears, and thin coat, but withal a heavy carcase of pork of good quality. The breeders of the Dorset also claim for them the quality of being good mothers, which is generally the case with animals recently crossed with those of another breed.

The *Tamworth* might also almost be called a local breed, as but very few of them are seen out of Warwickshire. They are, however, a distinct breed, their red

colour, long head, body, and legs, and their deep, flat ribs, being transmitted without fail to their descendants.

The Management of Pigs is generally considered to be within the power of any one, and yet no class of animal is so systematically mismanaged. A low, damp corner of the premises, facing north, is chosen, or rather happens to be fixed on, as it is useless for anything else, and, as results prove, worse than useless for rearing young pigs. Some of the principal requisites in breeding pigs successfully, are a warm, ventilated piggery, facing south or south-west, paved with bricks or flag stones—(not asphalte, as it is too cold for the little pigs in the winter), good drainage, great cleanliness, frequent feeding, and personal attention.

In choosing young sows for breeding it is better to pick the largest of the litter, with good wide hips, and at least 12 paps; let them be also from sows that have proved themselves good and quiet mothers. In the young boar, size is not considered so requisite, but let him be compactly built, showing plenty of quality, and yet be of a masculine character

The usual time to begin breeding from them is at the age of eight months, and the best times of the year to put the sow to the boar are October and April; and as the period of gestation is about 113 days, they will then produce their young either in February, so that the young pigs will have the whole benefit of the summer, or in July and August, when they will have time enough to get strong before the cold weather commences. Pigs farrowed the latter part of the year seldom do well; the cold seems to stunt them; and they cannot get that exercise which seems especially requisite for young pigs.

Care must be taken not to allow the sow too much litter when she farrows, as the little pigs often get entangled in the straw, and are then very likely to get laid on and killed. The best plan is to have the sow put into the house for a few nights before her time is up, giving her a few beans or maize to entice her in ; the being obliged to force her in often leads to wrong presentations, &c. Let her have just enough short litter to prevent the pigs falling on to the bricks. In general she is best left to herself with plenty of warm drink in her trough ; but when accustomed to be handled, as in the case of well bred or pedigree stock, she may be waited on. Have a hamper filled with dry wheat straw, then as the porkers appear on the scene suckle them and place them in the hamper, where they will rest comfortably until the sow has finished pigging. Remove the after-birth as soon as it becomes detached, then give the sow a little warm mixture either of milk or water and fine bran. She will then lie down. Place the pigs with her, and leave without much fear, providing the house has a fixed rail about 10 inches from the ground, and projecting about 8 inches from the wall. That will allow the little ones to get round the sow and prevent her lying on them. The sow should be fed on sharps for about three weeks, an ounce of sulphur being given to her every six days ; that generally prevents the pigs scouring, as they often will when about 20 days old, or as they begin to eat. Should the pigs show any symptoms of diarrhœa, give the sow morning and evening, $\frac{1}{4}$ oz. of bicarbonate of potash in her food, at the same time slightly reducing the quantity of food and placing clean water in a trough so that the little pigs can drink and so dilute the mother's milk, whose richness causes indigestion.

When the pigs are about a month old give them, in a place apart from their mother, a few oats and peas. They will at about eight weeks old have nearly weaned themselves, so that when their mother is taken from them they will scarcely miss her. When the pigs are six weeks old, those not required for breeding purposes may be spayed or castrated. For a time after they are weaned they require frequent feeding, giving them as much food in the shape of maize, oats, or peas, as they will clear up; they do better if they are allowed to have plenty of exercise when the weather is fine. If they are carefully attended to in their young stage they are, with fairly liberal feeding afterwards, fit to be killed at any age, and with very little expense in fattening.

Pigs as meat manufacturers are considered by many to hold first place, as their appetites are not in the least fastidious; refuse of almost any kind from the house or farmyard being converted into pork without any ado. In the neighbourhood of large towns quantities of pigs are fattened on the refuse, swill, and bones from the hotels. These are stewed up together, a little meal added, and then, as one of our largest exhibitors boasted, "his pigs are fed on turtle and gravy soup." Immense quantities of maize and foreign barley, added to potatoes, kohlrabi, and mangel are used in the fattening of pigs; but nothing produces meat of such nice quality as milk and barley and wheat meal. Numbers of pigs are fed in Cheshire, Derbyshire and other dairying counties on whey and buttermilk and meal; the meat is then white and of good flavour. Peas and beans, too, are used in fattening pigs, but the pork is hard and stringy if entirely made from the use of them, and it is yellow and flabby if only maize is used in feeding.

The quantity of meal, &c., consumed by pigs when put up to fat will vary considerably with the age and condition of the store pigs; a lean, hungry one consuming often as much again for a time as one that has been fairly well kept all its life. The latter will also at once show the effects of good food by beginning to thrive, whilst the former will devour a great deal of food without any apparent benefit. This, again, shows the good policy of keeping one's pigs in a thriving state from the time they are farrowed. A medium-sized, well-bred pig will eat, on an average, about 6 stone of meal per week, and increase in weight 1 stone.

Large numbers of pigs are bred from the common sow, crossed with a small or middle breed white boar, and are sold as porkers in the London market. They are killed at about 4 months old, and weigh from 5 to 6 stones each. They are well fed on barley and maize meal, with skim milk, from the time they begin to eat. They make the highest price, and are considered by many farmers to pay much better than keeping them until a year old and then fattening them.

Diseases of Pigs.—There are several diseases to which pigs are subject, but they all, or nearly all, seem to arise from unhealthy sties, want of cleanliness, and proper feeding. The most common complaints are—typhoid fever, murrain, mange, enlargement of the spleen, and inflammation of the lungs. Typhoid fever is perhaps the cause of the greatest loss amongst pig breeders, as it is highly infectious. Pigs that have been herded with others that have died from this disease are often sent to market, where they seem quite healthy, but sometimes within a few hours they fall ill, lose their strength, their pulse is

weak, they foam at the mouth, grunt plaintively as if in great pain ; purple spots appear on the belly and thighs, they refuse solid food, and care for nothing but drink. As a rule, it is better to have such a pig killed at once, and thus stamp out the infection. Use disinfectants freely, and keep the other pigs in a warm, dry place, giving them all a gentle dose of opening medicine. An ounce of sulphur and a little nitre answers as well as anything. If you decide to doctor the patient, bleed him at the back of the ears, or by cutting a little piece off the end of his tail ; keep him warm and quiet, giving him a little gruel, and from 2 to 6 oz. of equal parts of linseed and castor oil. In case he refuses to drink the mixture, cut a hole at the toe of an old shoe, place the fore part of the shoe in his mouth, and then pour in the oil at the top of the shoe ; the pig will generally chew the leather and swallow the medicine, without knowing it. After the medicine has operated, feed, sparingly and often, on good food, adding a tablespoonful of whiskey and a few drops of quinine.

The symptoms of murrain are staggering, shortness of breath, and the discharge of viscid matter from the eyes and mouth. If noticed in the early stages, and treated as typhoid fever, this disease is not necessarily fatal.

Mange is without doubt the result of the want of cleanliness ; it is a troublesome disease to get rid of, and is very infectious. It is easily discovered by the blotches or small pustules which appear on different parts of the body. The remedy is first to thoroughly wash the pig with soap and tepid water, then put him in an airy place with a good bed of clean dry wheat straw. Next give him 2 oz. of Epsom salts in some slops, feed him sparingly on roots and fine bran, giving him at each meal for three or

four days $\frac{1}{2}$ oz. of sulphur, and $\frac{1}{8}$ oz. of nitre. Apply externally each day until you see the pustules are dead, a mixture of oil and sulphur.

A pig suffering from enlargement of the spleen will wring and twist itself about, bending towards the ground as if in great pain internally. The cause of this disease being over-feeding with too rich food, the first thing is to clear out the bowels with a strong aperient, such as Epsom salts; reduce the quality as well as quantity of the pig's food, and give him the following day a blue pill rolled up in butter or in other tempting form. Repeat this in about three days, then be careful not to surfeit the pig, but feed him sparingly for a time.

Inflammation of the lungs, or, as it is called, "hevings," is seldom curable. If the pig is in good condition, the butcher can apply the best remedy. This disease is considered infectious, and is generally brought on by exposure to weather or lying on hot manure. Careful feeding and attention to diet sometimes enable you to fatten the pig, which when killed will often be found to have but one sound lung or one of them grown to the side.

CHAPTER VI.

BREEDS AND MANAGEMENT OF POULTRY.

Varieties : Setting Sorts—Laying Sorts. *Accommodation* : Houses—Food—Rearing. *Water Fowl* : Geese—Ducks. *Other Sorts* : Turkeys—Pea Fowl—Guinea Fowl.

FEW persons live in detached houses in the country but might keep, in their yards, with advantage, a few head of poultry ; and, on all farms, where there is always abundant space at hand and some waste food, the poultry ought to be an important department of the live stock. The demand for young fowls and for fresh eggs,—especially the latter,—is always great. The sum of money sent every year out of the country for them is very large ; in spite of which, during some months of each season, there always seems to be a scarcity of eggs. Yet it cannot be said that all persons are fit to be employed in the pursuit of poultry-keeping. A certain amount of knowledge of the wants of bird-life is necessary to begin with ; also a suitable homestead, if the owner is not to be disappointed, and if the poultry are not to be tortured.

It must be understood, at the outset, that all kinds of poultry do far best when at liberty to range, for, at all events, part of the day. And all fowls require, in addition to ordinary diet, grit, green leaves or roots, animal food in some form (flies, worms, &c.) if they are to be healthy or

prolific. And no creatures feel more keenly than poultry do the changes of sun and wind. It is therefore necessary that the birds should be able, in order to do themselves and their owners justice, to bask in the sun when this is not too hot; to have shade in the heat of the day; and to find shelter—when they wish for it—in wind or rain.

All this holds good with hens, ducks, geese, and turkeys; which, with Guinea and, perhaps, pea fowls, make up the usual collection in a poultry yard. Of course only a farm would allow the whole of these varieties to be kept to advantage. Still, in setting forth the peculiarities and the wants of poultry, although these general principles may be laid down for all, it may be desirable to give, in turn, a few words to each kind; and a beginning shall be made here with the land birds, and with hens first among these.

Varieties.—Within the last few years the number of so-called distinct varieties of fowls has been largely increased. Whether the breeds are originally distinct may be doubted. Not above five or six can be relied on to breed all their chickens like themselves. For practical purposes fowls may be treated as if there were but few kinds, for almost all require the same treatment. It may be convenient to group all the kinds at present cultivated under two headings.

The two groups must be described as, first, of fowls which immediately “set” or incubate after having laid a certain number of eggs; and second, of those which will generally continue laying, throughout the late spring and early summer months, without even wishing to set; *i.e.* we may call them “setters,” and “non-setters.” Among

the first—the group of setters—these further distinctions must be taken. They are either clean-legged or feather-legged fowls. Of the former (the clean-legged) the best known varieties are the Dorking or Sussex fowl, under which title must be included all the five-toed fowls of all colours, and also the cuckoo, the Scotch-grey, and the ordinary barndoor fowl. These are among the best for providing chickens for market. The game-breeds (with which must be reckoned the Malay) are steady setters, and the best of mothers. All the feather-legged fowls set. In this group are included the different shades of colour assigned to what are known as Cochin Chinas, with the grey birds called Brahmas, and the black called Langshans. The special merit of these feather-legged breeds is their tameness and their habit of winter laying: in order to which the earliest pullets of the spring must be retained—which will begin laying as early as the end of October. They also—better than any others—endure confinement within narrow limits. Then turning to those varieties which do not set on their eggs, the second group must be divided into single and rose-combed varieties. Of the former, the best known kinds are the black Spanish, blue Andalusian, black Minorca, and brown and white Leghorn. Under this head, also, come the crested varieties (under which must be included the Polish, the Houdan, and other French kinds). In this second group must be considered the whole of the varieties,—whether pencilled or spangled,—which are called Hamburgs, Chittaprats, or Dutch every day layers. Both single and rose-combed breeds furnish a large supply of eggs in summer; but the rose-combed are very impatient of confinement. The crested fowls are placed in this group because, though they

occasionally become "broody" or desirous of setting, yet they are not often to be trusted either to hatch eggs or to rear chickens which have been hatched in other ways.

Now as regards their treatment it matters little to which of these varieties the fowls we propose to keep may belong; for all alike need a certain degree of freedom, and a free exposure to sun, to be at all productive, especially in winter. Only people of experience can keep fowls healthy in confinement. The most experienced can hardly keep them confined long. Young fowls, *i.e.* the early pullets of the year, lay the largest quantity of winter eggs; but no fowls, young or old, can be expected to reach the standard of high health, at which laying begins, unless they be well fed with a large variety of food. It is comparatively easy to fatten a fowl in a few weeks; but to preserve one in constant high condition, so as to enable it to lay regularly, good meals, from the owner's hands, are requisite; with tit-bits picked up for itself upon the yard or road-side hedges. It is a mistake to suppose that the hens do best which have a neat garden or trim compartment to run on. Fowls and untidiness go well together. An open common or highway where cattle have been—which, with their droppings, attract flies—is better range for fowls than is the neatest flower bed; whilst rough shrubs to give shade, or shelter insects, are very desirable. Given these—*i.e.*, a rough place to run about in—then the task of the poultry keeper will be comparatively easy; for his main duties will be discharged by the birds themselves.

Accommodation.—This is of the very first importance in order to attain success. The first thing of course will be to provide a roosting place. The lighter breeds (as game,

Hamburg, &c.), retain the old instinct of the wild race from which they sprung ; and, if possible, will roost high on trees or shrubs, or in the cross-beams in the roof of any building. Fowls never thrive better than where they can safely be allowed so to roost. Dorkings should not be forced to roost high, and they require broad perches. Except caution be taken in these respects the birds are apt to become lame, and their breast bones to be bent and disfigured. The feather-legged kinds, are indifferent to a high place to rest in ; indeed, hardly care to get upon a perch at all. They will squat anywhere, as partridges in the middle of a field, and do well so in summer. Any old tub or box will serve to shelter them, in a position where thieves or vermin are not likely to intrude. They sit at night, by preference, on a board or on the bare ground.

Food.—And then for the food ! The amount of this which will be essential must be determined by the range which the birds are likely to get. If the fowls can escape from their roosts at daybreak ; and wander at will over grass land, or among the heaps of refuse from a stable, it will be enough to give them two feeds a day ; one of sound grain after the family breakfast, and one the last thing at night before the birds go to roost. Of all grain the best is sound, heavy barley of English growth. Wheat is good, but not for a long continuance, and maize produces more of fat than of eggs. The feed of the day when there is not sufficient range should be of meal, mixed with water (or, better, skim-milk), and any refuse vegetables or crusts from the house should be added. Care must be taken that the food is not allowed to become sour. Where, however, the birds are in confinement at night, they should be fed

the first thing, when the household is astir ; and care must be taken, then, to supply clean water as well as food thrice a day ; with sharp gravel, and chalk, or pounded or burnt oyster shells, occasionally, when eggs are looked for. Birds in confinement during long hours will also require to have grass turf, supplied regularly, to furnish them with salad and occupation. If they have not employment, the birds will pull off one another's feathers.

The Rearing of Chickens, even more than the keeping of adults for laying, will require either space or extraordinary attention. No doubt chickens may be kept, for a few days, wholly indoors ; but they rarely grow well until they can range with the hen. All hens hatch and rear their broods far best when at liberty, each to choose for herself a place in which to lay and to sit upon her eggs, and to rove at will with the chickens, after these are strong enough to follow her. The hen can hardly be left too much alone to hatch and bring up her brood. All other hens should be kept from interfering with her, as also intruders of any kind. Yet it is well to confine the mother of a young brood for some few days, until the dew is off the grass, even when the season has become genial. Broods, hatched at a season when it is not natural to expect them, require even more of extra attention and skill from their owners than do old birds confined. Nature does not suggest either winter broods, or life in a cage. Thus poultry, however domesticated, thrive best when the natural conditions of liberty and season are respected. Yet a demand for eggs and chickens at times (as autumn and winter), when Nature does not incline the birds to produce them, can only be met by artificial arrangements.

It is necessary to hatch broods early in spring to have winter layers. Now the feather-legged breeds came originally from a home in which the seasons do not correspond with ours. It is natural, therefore, to them to begin to lay, when breeds, longer acclimatised in Europe, are beginning to moult and to leave off. Early hatched Cochin or Brahma pullets can be relied on to lay in October and November, as indeed can early hatched pullets of most of the clean-legged breeds. But the feather-legged varieties carry out their laying more persistently; even though snow and cold weather intervene. They will go on, where well supplied with food and water, to sit and hatch even in the shortest and dreariest days of an English winter. They are also good, though somewhat clumsy, mothers; and are largely employed as nurses, for all other sorts of poultry, even for goslings.

From these general remarks it is hoped that it may be seen that the keeping poultry successfully, depends upon the place being adapted to them; upon knowing the natural wants of the birds; and upon supplying these with scrupulous care and completeness when the fowls cannot wait upon themselves. Few special details are given because these will differ in different places. The natural, universal wants may be thus summed up:—A dry, safe place to pass the night in; and during the day access to clean, untainted ground, where insects, grit, green meat may be had; with a dusty corner to bask in when the sun shines; and something to break the wind or sun when these are more than ordinarily strong. The dust bath must never be neglected with land-birds; it plays for fowls the part which soap and water does for ourselves. Entire confinement is best borne by the feather-legged

breeds, or by the Spanish and its sub-varieties. Dorkings, Hamburgs, and all the game breeds are not fruitful, except when entirely at large. Cold rarely hurts any fowls; except the non-setters with large, single combs.

Water Fowls.—Keeping these to advantage, whether geese or ducks, depends upon attention to the same principles. First consider the natural habit of the birds, and then consider how far these can be permitted. All restrictions put upon the birds involve extra trouble in providing substitutes. Geese and ducks do not require so warm or dry a night-lodging as land birds. Where no enemies are to be dreaded, waterfowl do best on the pond, or its outskirts, at night; they feed earlier and later than hens. But it should be remembered that rats are more destructive to ducklings than to chickens. Ducks well repay an ample range. By collecting slugs and worms, which are otherwise destructive, ducks save a great part of the expense of feeding them, and do good to the orchard and pasture besides. Geese cannot be reared without some space to graze on; for bits of grass, nibbled where it grows, seem quite essential to the thriving of young goslings. But, when reared up to a certain stage, goslings can be finished and fattened in confinement. The most common varieties of ducks are the white Aylesbury and a modern introduction—the white Pekin, which differs from the Aylesbury in its almost orange-yellow bill and feet. The bill of the Aylesbury is of a flesh-colour. The brown Rouens of the colour of the wild duck, and the black Labrador (which with call-ducks are the bantams of the water birds), cannot be kept profitably, except when at large. The Ayles-

bury variety is the best for producing eggs. It best bears confinement; and, as it begins to lay earlier than any other, it is the best for hatching early ducklings. These are among the most profitable of all poultry to send to market. It is necessary, however, to provide foster mothers, or an incubator; for Aylesbury ducks rarely set.

The principal varieties of geese cultivated in England are a very large grey variety commonly spoken of as Toulouse; a pure white breed known as Embden; and a parti-coloured breed, which is general through Great Britain. This last, although smaller in size, is the most fertile of all; rearing always two, and sometimes three broods in a season. The Toulouse geese lay a good many eggs in spring, but rarely hatch them. The Embden variety very frequently omits to produce a second brood; yet its pure white plumage and grand size make it a great favourite. Unless on farms geese should not be attempted except there be access to wide roadside grazing.

Other Breeds.—All that has been said, as to range, applies to turkeys, pea fowls, and guinea fowls. These are but semi-domesticated; they cannot endure long confinement, even within a large yard. They must wander at will to be healthy. They are not often profitable, even when allowed to range; except, perhaps, turkeys upon farms where there is much corn, shed in the fields, to be had for nothing. Of all three breeds there are white sub-varieties. But these seem rather smaller and less vigorous than their coloured relatives. Of turkeys, beside the white, there are bronze and black kinds. The former (known as Cambridgeshire) is the larger, but the latter is preferred for its delicacy of flesh. No amount of reading can really supply

the kind of experience which is required to make a successful keeper of any of these varieties of poultry. It will be necessary first to see for oneself how experienced people treat their birds, especially how they feed the newly-hatched broods. And next, one must be willing to study carefully the reasons for the habits of the birds themselves. They, and their instincts, give the best finishing lessons to a would-be poultry keeper. Some general advice may be attempted. We must begin by determining to be very regular in feeding (especially young chickens, which, after the first day or two, need attention every hour). We must preserve great cleanliness in coops and drinking vessels. And whilst giving each time all the food that the birds care to pick up, it is never wise to leave any food by them. They should have enough, but no more. All excess, after the birds are well satisfied, is not only a waste of money, but a preparation for disease. What is the best food to buy, and how to prepare such food, are questions which can only be answered by knowing what the poultry keeper has of his own to spare. It rarely pays to buy all the food poultry require; they will, however, consume much of the refuse of a household (which, without them, would be wasted); there is hardly any kind of food used in a house which poultry will not eat, and the additional food which is necessary is well repaid by the eggs. House scraps, with chopped vegetables, are best given when mixed with meal; and of all meals barley is the best, miller's offal next, and maize meal worst of all. But an occasional change seems to improve the condition of fowls. The great precautions besides cleanliness are to see that the birds are never without pure water, and that the food be not wasted by too large a quantity at once.

CHAPTER VII.

HEALTH AND AGE.

Climate : Marsh Land—Damp Air—Foot and Liver Rot. *Habitation* : Dry Site—Ventilation. *Food* : Waste of Tissues—Constituents of Flesh and Food—Quality of Food—Digestive Apparatus. *Water* : Quantity—Quality—Purity. *Age* : Dentition of Horse, Ox, Sheep, Swine.

THE art of preserving health is based on a knowledge of the laws which govern animal life. It is one of the most important known to man. While animals are healthy their owners are enriched by their uninterrupted work and usefulness. In a state of sickness they are a source not only of loss but of danger. The bite of the rabid dog ; that deadly disease of the horse known as glanders ; tapeworm, to which man also is subject ; are one and all transmissible from animal to man. The health of the lower animals, therefore, should be guarded, and all those who attend on them should be acquainted with the rules for securing and maintaining it.

The art of preserving health embraces a large and varied field of human knowledge, comprehending all the conditions and requirements of animal existence. Among these are the influence of climate, of habitation, air, food, water, and employment.

Influence of Climate.—By the term climate is under-

stood all those influences that cause a district to be hot or cold, moist or dry, arising mainly out of the character and changes of the seasons, due to differences of altitude, latitude, proximity to the sea or to mountain chains, distribution of land and water, the prevailing winds, oceanic currents, and general aspect. The surface of the land and cultivation of the soil are likewise important matters in regulating the character of climate. The health of a country depends in a great degree on the amount of low-lying or marsh land it contains, and the extent to which the soil remains undrained. In marshy districts animal and vegetable matters form a large proportion of the soil, and under the influence of heat and moisture these substances are ever undergoing putrefaction and giving off vapours and germs injurious to health. When rivers overflow their banks, and spread their waters over land of an alluvial or boggy nature, the herbage becomes rank, watery, and deficient of nutriment. Animals reared on such food are wanting in size, weakly in constitution, and easily fall a prey to disease. Moreover, the dampness of the soil, and the cold noxious vapours that rise from it and hang about the body seriously lower the vitality and enfeeble the powers of life, and they may even alone excite disease. Marshy districts prove specially injurious to health during hot summers, when the ground surface is exposed to the heat of the sun after long immersion in water. Under such circumstances cattle and horses should not be allowed in the open fields during the night or early morning while the atmosphere is humid and heavy, and loaded with the peculiar poisonous exhalations from the soil. In the low damp valleys, which follow the course of rivers, "foot rot" and fluke disease or "liver rot," as it is termed, are

always prevalent to a greater or less extent. Foot rot is there caused by the softening influence of the wet turf on the hoofs of sheep, by which they are caused to break and tear. The fleshy parts of the foot are thus exposed to the irritating action of dirt, and in this way ulceration, pain, and lameness arise.

Pastures given to excessive moisture should, as far as possible, be avoided for sheep grazing, excepting in the middle of the day, when the surface moisture has been dispersed. They are further dangerous to health and life in harbouring certain descriptions of snails, which carry upon or within their bodies the larvæ or young parasites which occasion "liver rot," a disease everywhere prevalent in wet seasons, excepting on so-called salt marshes. The almost entire freedom from "rot" or so-called fluke disease enjoyed by farm stock when turned on these marshes, is possibly due to the absence in such places of the particular kind of snail in whose body the young flukes are lodged or nursed prior to being swallowed by sheep or other animals; or it may be that the embryos or young parasites are destroyed by the saline matter with which the soil is impregnated. Elevated localities are generally found to be as conducive to health as low-lying marsh districts are destructive of it, providing that they offer a permeable subsoil for the escape of water. In ascending from the latter to the former, the pressure of the atmosphere becomes reduced, the temperature is lower, the quantity of the moisture in the air is less, and the peculiar organisms, germs, and noxious gases, so obnoxious in marsh air, are here absent or in very small amount.

The effect of a diminution of atmospheric pressure on the vital functions is very marked in high situations;

thus the pulse becomes quickened, the breathing more frequent, and the exhalations from the skin and lungs are increased and pass freely away, instead of being condensed on the body to cool and starve it. Such districts afford an abundant and rich vegetation, which, together with a pure dry air, renders them highly conducive to health.

Influence of Habitation.—Farm stock usually spend the early period of their life in the open pastures; and, provided they are not exposed to those adverse climatic conditions to which we have referred, the standard of health may be fairly maintained by ordinary care. Protection from extremes of cold and heat, and from exposure to wet, is, however, essential to the maintenance of a healthy and vigorous growth; and when stock are at pasture, suitable shedding should be provided. Natural shelter from the north and east winds can, in a great measure, be secured by the cultivation of stout, well-grown hedges or by the judicious planting of trees. In the case of old or adult horses, summer grazing often proves highly objectionable. When the weather is hot, and flies attack them in large numbers, they are prevented from feeding. Moreover, the repeated stamping to dislodge the offenders causes much swelling and soreness of the legs, tires the muscles, and weakens the parts it was originally intended to strengthen. The eyes also frequently become swollen and inflamed, and the general health, from these causes, coupled with restlessness and insufficiency of food, may seriously suffer.

In choosing a site for the erection of stables, cowsheds, kennels, and other animal habitations, preference should at all times be given to an elevated position, where plenty

of light and air are to be obtained. The soil should be dry, and the conformation of the locality such as to favour perfect drainage. A good supply of water should be at hand, and every facility offered for the proper and perfect removal of sewage. To be healthy, animal dwellings should be large, lofty, dry, and well ventilated. They should not be placed too near to each other, but in such relation as to allow a free circulation of air within and about them. The ends of stables, &c., should if possible stand north and south, so as to expose the two sides of the building to the sun. By this arrangement warmth, dryness, and a more perfect natural ventilation is secured. Local circumstances, such as hills, woods, and buildings, may render another aspect advisable. In that case the next best position for acquiring sun, air, and light must be chosen.

Life and health are dependent upon the free passage of pure air into the lungs. While there, oxygen is given up to the blood, and carbonic acid passes from it, being expelled in the act of respiration. The air is constantly receiving into it large quantities of foreign matter, organic and inorganic, living and dead, in the form of minute solid particles, as well as noxious vapours and gases, evolved from the decomposition of animal and vegetable substances, or thrown off from the lungs and skin of man and animals in the process of respiration. Disease germs of the most subtle character are also known to exist in it at times, and to be carried by it from sick animals to healthy ones, and thus to occasion fatal and widespread epizootics. These disease germs, as they are termed, are best known to us in connection with cattle plague, sheep pox, foot-and-mouth disease, and some other disorders of an infectious charac-

ter which from time to time have destroyed our flocks and herds. To maintain the atmosphere in a state of purity is one of the first principles of hygiene. Where animals are confined in stables, cowsheds, and other habitations, the atmosphere of such places is constantly being vitiated by carbonic acid evolved from the lungs and skin, and by the vapours and gases given off from the urine, manure, and decomposing matters of food and sewage. The danger to health arising out of this contamination will be inversely as the size of the apartment in relation to the number of animals it contains, and the means adopted for insuring a constant change of air in the dwelling. With a view to preserve health, the habitations of animals should be large and lofty, and overcrowding should be scrupulously avoided. By packing together large numbers of animals in a small space, the air soon becomes loaded with the impurities referred to. In this foul state of the atmosphere the blood is insufficiently oxygenised, and in this vitiated or diseased state the working powers or functional activity of the various organs of the body is retarded, and health correspondingly deranged. Whether the building be large or small, a free and constant movement of air should be provided for by proper means of ventilation, but in such a manner as to prevent a too rapid current through it, which may occasion the sensation of draught.

Ventilation is effected by natural and artificial means. The natural means consist in—(1) the natural tendency of gases to mix one with the other; (2) the force of winds, which is sometimes very efficient, but at all times uncertain and uncontrollable; (3) the difference in weight of masses of air of unequal temperature. Thus

warm air, being lighter than cold, expands, and rises to the highest point of the apartment. If no outlet exists by which it can escape it soon becomes cool, and, condensing, falls to a lower level. It now gains entrance to the lungs a second time in its impure condition, and so it may be respired again and again, each time becoming more injurious to health. The heavier air remains below, to ascend as its temperature increases. This elevation of temperature is due partly to the heated air expelled from the lungs and partly also to the heat given off from the surface of the body. In order to allow of a regular and constant change, openings or outlets for the warm air should exist in the upper portion of the apartment near to the ceiling, and inlets for the cool pure atmosphere are to be provided below. These openings should not be placed too near to each other, or the cold air will pass out again without being respired. Artificial ventilation is seldom or never resorted to in the management of our domesticated animals. Nothing contributes so much to render the air impure as defective or badly managed drains. To avoid contamination from this source a good fall for the sewage should be provided, and daily flushings of the drains should be regularly practised.

Influence of Food.—From birth to death the body of every living creature undergoes an incessant waste, breaking up, or resolution, of their tissues. This is brought about by the combustion or burning of the flesh by the oxygen of the air, of which we have just spoken as so essential to life. If food be withheld, the body gradually becomes reduced in weight and bulk, and ultimately inanition and death are induced. The time required to

bring about these results varies in different animals. The health of cold-blooded animals, as the frog, does not appear to suffer so much as that of others of a warm-blooded nature. Frogs have been known to fast for three years ; but a comparatively brief period of abstinence is sufficient to impair the health of our domesticated animals. To compensate for this constant waste, and to build up the ever-decaying organism, and maintain it in a state of activity, is the special function of food. To uphold perfect nutrition the food should consist of nitrogenous and non-nitrogenous aliments, embracing four classes of substances—viz., (1) the albumenoids or flesh-formers ; (2) animal or vegetable fats ; (3) starchy and saccharine substances known as carbo-hydrates ; (4) mineral salts, and water.

The flesh of the body is built up of these several constituents, as is also milk, and no aliment can be said to be complete, or capable of maintaining health for a length of time without them. To maintain a healthy condition of the system an adult animal should receive such a quantity as will equal the waste of the tissues ; this is called the necessary ration. A still larger amount will result in an increase of flesh, an accumulation of fat, or the production of milk in the cow or wool in the sheep. In the young animal the food supply must exceed the waste, in order to meet the requirements of growth, and build up the body to its natural limits. For several weeks after birth young stock are incapable of eating ordinary food. Their teeth are not developed, and their digestive organs generally are unfitted to receive and act upon the coarse alimentary substances furnished to older animals. During this period they live entirely on milk derived from

the mother, and in a great measure the health of the former is dependent on the bodily condition of the latter. The milk of animals in a state of disease or of excitement or fright is liable to great alterations in its quality, and acquires properties which may seriously derange the health of the young, or even destroy life. The milk of cows suffering under an attack of foot-and mouth disease, for example, contains the germs of that malady, and proves infectious and sometimes immediately poisonous to the young, and it is also said to affect children injuriously. A knowledge of these facts should put us on our guard, and lead us to avoid the use of milk from unhealthy stock. When food is allowed in excess the stomach is taxed and digestion is incomplete. The undigested matter undergoes fermentation in the alimentary canal; gas is given off in large volumes, and sickness follows; or, as often occurs in the horse, the channel of the intestines may become filled up with a closely packed mass of solid matter. Frequently these blocks of ingesta prove incapable of being removed during life, and lead on to the death of the animal. Deficiency of food is not less injurious to health than an excess of it. If continued for many days it leads to wasting of the body, weakness of the muscles, great depression and fever. Animals insufficiently nourished prove susceptible of contagious disorders, which they quickly contract when exposed to infection. Moreover they the more readily become the victims of parasitic affections. Lice and the peculiar minute plant or fungus to which ringworm is due are both found to flourish and propagate vigorously under the influence of poverty and dirt. Long intervals between meals is not conducive to health. Like fatigue, it weakens

the powers of digestion and disorders the alimentary organs.

Different species of animals require different descriptions of food. Dogs and cats consume flesh, and are termed carnivorous. Horses, oxen, and sheep require grasses, seeds, roots, &c., and are known as graminivorous feeders. Pigs, like man, eat both, and are distinguished as omnivorous animals.

The quantity of food necessary to a healthy state will depend upon quality, temperature, labour performed, and the size and age of the animal. Quality of food is of the first importance in dealing with live stock. Endurance, growth, fattening, and profit, as well as health depend upon it.

Fodder of all kinds, and also grain when damaged by long exposure to wet, lose much of their nutriment and sweetness, and acquire injurious properties. In damp seasons hay gets mouldy, and oats often require to be kiln-dried, in which condition both substances may be injurious to the health of stock. Food having undergone fermentation—such as stale vetches, grass, grains, and various prepared aliments—constitutes a most unwholesome diet by inducing many dangerous disorders of the stomach and bowels. Roots in a state of decay induce blood poisoning, disorder the milk of ewes and cows, and act prejudicially on the young of both. In warm weather a much less quantity of food is consumed than in cold, and it has been shown that both sheep and oxen thrive better in warm, dry sheds on a smaller quantity of food than they do in the open fields. The more exertion an animal undergoes the greater is the wear and tear of the system. Exercise increases the respiration or breathing; more oxygen is consequently taken

into the system, and the tissues of the body are burned up in proportion. Unless this extra waste is met by an additional supply of food, emaciation and sickness follow. The amount of food consumed by young animals is relatively greater than that of old ones, for reasons above mentioned. How to feed? what to feed upon? are the most important questions in the economy of health. Their solution involves a knowledge of the habits and aptitude of animals, the nature and properties of food, and the physiological processes by which it is converted into flesh. The organs of digestion vary in different animals, and call for a different mode of feeding, as well as differences in the kind of food used. The size of the horse's stomach is remarkably small in comparison with his body, while those of the ox and sheep are voluminous and somewhat complicated in their arrangement. The former requires to be fed frequently, not less than three times daily, and to receive a moderate quantity at one time. It is also of the highest importance to health in dealing with all beasts of burden, that a sufficient time should elapse after feeding for digestion to be well-nigh completed before animals are put to exertion. This is especially the case where quick or otherwise severe work is required to be performed. A loaded stomach causes much embarrassment of the breathing by pressing upon the lungs, and sometimes leads to very serious consequences. Moreover, digestion is only indifferently carried on under exertion, and many derangements of the stomach, bowels, and other organs, owe their origin to this cause alone.

The capacious stomachs of oxen and sheep enable them to take in large quantities of food at one time, and as they are not used for quick or otherwise laborious work, but little

inconvenience arises out of it. In the case of working oxen, however, the diet must be less bulky than for ordinary cattle, and the diminished quantity supplied to them may be compensated by an additional amount of concentrated and more nourishing aliment. In connection with food, the germs of animal parasites play an important part in impairing the health of farm stock, and should as far as possible be excluded from the pastures and habitations of the latter. Sheep whose livers contain flukes, discharge the eggs of those parasites from the bowels on to the pastures, there to hatch out their young, which other sheep devour with the herbage and become in turn the subjects of "rot." Similarly, shepherd and other dogs infested with tapeworm are often a fruitful source of sickness among cattle and sheep. When the eggs of these parasites are expelled from the intestines of the dog on the grass land, or when they are mixed with any article of diet and eaten by cattle or sheep, bladder worms or hydatids are produced in various organs of the body, as the brain (in "gid"), liver, lungs, &c.; and protracted sickness or death may be the result. To obviate this mishap, dogs known to have tapeworm should not be allowed access to the feeding grounds of farm stock.

Water is an indispensable alimentary principle. The flesh of animals, and the tissues of plants, are largely made up of it. A complete withdrawal of water is soon followed by death, and an insufficient supply induces disease, as may also an excess under some circumstances. The quality of water, no less than the quantity, has a material influence on the health of stock; and its employment in the cleansing of stables, dairy utensils, drains,

sewers, &c., contributes in a very great measure to ward off disease.

Large quantities of this fluid are continually leaving the body in the form of visible or invisible sweat. The air discharged from the lungs in the process of breathing is loaded with it in a state of vapour, besides which it is being constantly thrown off from every part of the surface of the body. From the bladder water is discharged in large quantities, and the other excretions of the body owe their moisture to its presence. Without it the blood would cease to flow, and a suspension of all the functions of life must necessarily follow. The demand for water is expressed by the sensation known as thirst. When, as sometimes occurs, more is imbibed than is required for the purposes of life, the excess is rapidly eliminated or cast out of the system through the kidneys, skin, and lungs, &c. In this way a certain standard of proportion is maintained in relation to the solids of the body. The quantity required to uphold the bodily health varies for different animals, and for the same animal under different conditions. The elephant will consume twenty-five gallons per day, while for horses and oxen one-third of that amount is found to be sufficient, and for sheep and pigs two to three quarts proves ample. Hot sultry weather usually augments the desire for water, owing to the large amount got rid of by the skin in perspiration. For the same reason, animals subjected to severe exertion suffer great thirst, and require an additional supply to that needed in a state of quiet. When confined in warm stables or sheds, both horses and oxen require more than when turned out in the open; and the same remark applies to all the other of our domesticated

creatures. Food in a dry condition provokes thirst equally with external warmth and activity, and an extra allowance of water under these circumstances is necessary to the efficient digestion and solution of the nutrient constituents it contains. Certain animals, among them the sheep, are considered by some to be indifferent to water. It is true that in a state of domestication, where food of a juicy or succulent character forms the staple diet, there is little or no demand for extraneous fluid, but in their desert home sheep are known to travel far and wide in pursuit of it.

An insufficient supply of water is said to prevent the discharge both of carbonic acid from the lungs, and of the *débris* of the used up tissues with which the urine is naturally loaded. The retention of the products of lung combustion leads to an overcharging of the blood with effete and noxious matter. Muscular energy is thereby reduced, and great prostration and disease are the consequence. Water never occurs in Nature in a state of perfect purity, Even in the most salubrious locality rain-water, which is regarded as the purest of all natural waters, contains a slight amount of foreign matter. River and spring water hold in solution or in suspension various substances of an organic or inorganic nature. Of the inorganic constituents some are essential to the maintenance of health and life. They take an active part in building up the various tissues, and supplying the waste which is constantly taking place. Besides these elements of nutrition, it sometimes contains substances which, while in certain proportion, prove harmless, yet when taken in larger quantity, tend to upset the balance of health and induce disease. Water when

largely impregnated with salts of lime is said to be hard. The long-continued use of it provokes various disorders of the stomach and bowels, and predisposes to the formation of earthy concretions or stones in the bladder, as well as in the viscera referred to. In the horse constipation and colicky pains are frequently induced by it. When stored in lead tanks or circulated through lead pipes, water is liable to contamination by salts of that metal. This is especially the case in regard to rain-water. The action of lead when introduced into the system usually results in colic, paralysis, and brain disease. The salts of various metals may sometimes be found in streams adjoining factories and smelting works. Water thus contaminated has often proved mischievous to the health of cattle depastured thereabouts. The water of salt marshes, rendered brackish by sea water, often proves injurious to health by deranging digestion and inducing diarrhoea.

In a very large number of instances the water consumed by farm stock contains a considerable amount of both animal and vegetable matter in a state of suspension and solution. And although the immediate effect of such water may not appear to occasion any perceptible disturbance of the system, there can be no doubt that its long continuance does seriously impair the healthy functions of the body, having the effect of predisposing it to various forms of disease, of which diarrhoea and dysentery are the more common. Specific contagious fevers, such as cattle plague, foot-and-mouth disease, pig typhoid, anthrax, and the like, may all be disseminated by water contaminated with their respective germs. In like manner the eggs of various

parasites are scattered, and may find their way into the bodies of suitable hosts.

In the dispensing of water, as well as in selecting it, care and judgment are sometimes much needed. When cold it should not be allowed to animals in a heated condition, excepting in small quantities when work is about to be continued at once. Long fasting induces fatigue and depression, and seriously compromises health. The quantity of water to be given at one time will vary under different circumstances. In a state of rest animals should be allowed as much as they will take, but where they are likely to be called upon to perform severe exertion, smaller quantities are advisable, and in that case the allowance will require to be repeated at short intervals.

It is safer and better to give water before feeding than after. In the latter case the food is liable to be washed out of the stomach prematurely, while in an imperfectly digested state, and thus occasion intestinal irritation and disease.

Hereditary Influence.—"Like begets like" is an expression as true of health and vigour of constitution as it is of colour, symmetry, character, and outward form. It is to a knowledge of this fact, and the enterprise it has awakened in the stock-breeders of this country, that the super-excellence of English horses, oxen, and sheep, is attributable. Just as the progeny of our domestic creatures bear the general impress, temperament, and qualities of the parent, so do they inherit the strength or weakness of the latter, and their tendency or predisposition to actual disease. The influence of parentage is as decidedly and completely shown in the good or indifferent performance

of the various functions of the body as it is in the exterior physical conformation ; and the defects of the one are as readily transmitted from parent to offspring as are those of the other. Weak lungs are as capable of being directly and powerfully inherited as are bent limbs and other bodily distortions, and even in some instances as the colour of the animal itself. General constitutional weakness, with an aptitude to relapse into disease, is the inheritance of some of our most valuable strains of both horses, oxen, and sheep. The over-zealous desire to introduce or improve some special quality of form, function, or expression, or to modify the general appearance in conformity with the requirements of breeders of stock, has led to the adoption of a system of in-and-in breeding, *i.e.*, the mating of animals of the same family or strain or kindred blood.

The results obtained have been highly beneficial in promoting rapid growth, early maturity, and fattening properties ; but they have likewise in numerous instances proved destructive of constitutional vigour and general health, by multiplying the intensity of family infirmities. From a health point of view, it is of the highest importance to breeders of farm stock that dams and sires should be judiciously selected. Only animals with sound constitution and good physical development, born of sound parents, should be used for stock purposes. Some of the most intractable, enduring, and fatal diseases are hereditary and transmissible from parent to offspring. The destructive disorders known as tuberculosis and scrofula, which present themselves in the form of consumption or wasting, are among the number. Rheumatism, rickets, and the various diseases of the legs of horses known as splints, spavins,

ringbones, and curbs are all the outcome of inherited weakness in by far the majority of cases.

Roaring, broken wind, and ophthalmia or inflammation of the eye—diseases which incapacitate and render worthless some of our best equine blood—are born of hereditary influence. Similarly the powers of endurance possessed by some horses, and the tolerance of cold and deprivation exhibited by some other animals, are properties built up in the constitution and handed down from parent to progeny. Certain strains of racehorses, for example, are notorious for carrying heavy weights over long distances, and other feats of endurance of which other equally strong and highly-trained animals are utterly incapable.

The hereditary tendency to disease may be strongly or slightly inherited. In some families particular weaknesses appear in every member, at one period or another. In others they appear only occasionally, or may even altogether disappear from one or many generations—to return again under the influence of indifferent regard for the laws of health. The influence of external circumstance may do much to uphold health and ward off disease where the tendency to it is only feebly inherited, and even in some cases permanently stamp out the morbid faculty altogether. In this connection good food, a suitable climate, and the general observance of the laws of health, added to judicious crossing with sound stock, are the essential elements of success.

Age.—We add here a paragraph descriptive of the dentition of farm-stock as indicative of age. The teeth of our domesticated animals vary in size, form, character, and number, in accordance with the nature

of the food on which they live, and also in accordance with the peculiar organisation and habits of life of the animals themselves. They are also capable of being materially influenced in their development by the system under which stock are reared. In highly bred and liberally fed animals the teeth are produced earlier than in those living under the reverse conditions. It is therefore necessary to take this point into consideration in determining the question of age. Teeth are divided into three classes, viz.: molars or grinding teeth, incisors or cutting teeth, and canines or tushes. All our domesticated animals possess the two former but not in equal numbers. The ox and sheep have no incisors in the upper jaw, neither have they any canine teeth or tushes. Besides the three varieties mentioned, the pig has also a small tooth in each jaw situated between the corner incisor tooth and the first molar; this is termed the premolar. Each animal has two sets of teeth during life: the first are termed the milk or sucking teeth, also known as temporary or deciduous in consequence of their being shed or cast off; the second set, by which they are replaced, are known as the permanent or adult teeth. The teeth appear in the mouth with tolerable regularity and in a certain definite order, so that they afford a fairly reliable indication of the age of stock up to the time when dentition is completed. The temporary teeth differ from the permanent in size, form, and character, and are readily distinguished from each other after a little careful study. The molar teeth are distinguished numerically, counting from front to back, viz.: first, second, third, and so on. The incisors of the horse and pig are six in number in each jaw, the two middle ones are termed *centrals*, the next pair

laterals, and the outermost *corners*. In the ox and sheep there are eight cutting teeth. Those next the centrals are spoken of as *lateral centrals*, and the other two pairs as in the horse and pig.

The following table shows the order of succession in which the changes take place in the horse, ox, pig, and sheep.

HORSE.

TEMPORARY INCISORS.

<i>Period.</i>	<i>Number.</i>	<i>Position.</i>
At birth	2	Central.
3 to 5 weeks old	2	Lateral.
9 to 10 months old	2	Corner.

PERMANENT INCISORS.

2 years 6 months old	2	Central.
3 years 6 months old	2	Lateral.
4 years 6 months old	2	Corner.

TEMPORARY MOLARS.

At birth	3	First, Second, Third.
--------------------	---	-----------------------

PERMANENT MOLARS.

1 year 3 months old	1	Fourth.
1 year 9 months old	1	Fifth.
2 years 6 to 9 months old	1	First.
3 years to 3 years 3 months old	1	Second.
3 years 3 months to 6 months old	1	Third.
3 years 9 months to 4 years old	1	Sixth.

TUSHES.

4 years 3 months old	4	
--------------------------------	---	--

From a consideration of the above tables, it will be seen that at ten months old there are present in the horse's mouth six temporary incisors, and the first, second, and third temporary molars. At one year and nine months the fourth and fifth permanent molars have appeared, and a year later the first temporary molar is changed and the two central incisors are permanent. At three years and six months old the second and third temporary molars have been replaced by permanent ones, and the two lateral incisors are also permanent. At four years and a half old the temporary corner teeth are shed and the last molar and tusks are up, so that at this time dentition is fairly completed.

OX.

TEMPORARY INCISORS.

<i>Period.</i>	<i>Number.</i>	<i>Position.</i>
At birth	2	Central.
"	2	Lateral Central.
12 to 14 days old	2	Lateral.
21 to 28 days old	2	Corner.

PERMANENT INCISORS.

1 year 9 months old	2	Central.
2 years 3 months old	2	Lateral Central.
2 years 9 months old	2	Lateral.
3 years 3 months old	2	Corner.

TEMPORARY MOLARS.

21 to 28 days old	3	First, Second, Third.
-----------------------------	---	-----------------------

PERMANENT MOLARS.

6 months old	1	Fourth.
15 months old	1	Fifth.
24 months old	1	Sixth.
24 to 30 months old	2	First and Second l.
30 to 36 months old	1	Third.

At one month old the ox has a full complement of incisors, with three temporary molars in each jaw. At two years old the fourth, fifth, and sixth permanent molars are present, and the two central incisors are changed. At two years and a half old the first and second molars are cast, and the lateral central incisors are permanent. At three years and three months all the temporary teeth are shed, and have been replaced by permanent ones.

SHEEP.

TEMPORARY INCISORS.

<i>Period.</i>	<i>Number.</i>	<i>Position.</i>
4 to 7 days old	2	Central.
7 " 10 " " old	2	Lateral Central.
21 to 28 days old	2	Lateral.
	2	Corner.

PERMANENT INCISORS.

1 year old	2	Central.
1 year 6 months old	2	Lateral Central.
2 years 3 months old	2	Lateral.
3 years old	2	Corner.

TEMPORARY MOLARS.

14 to 21 days old	3	First, Second, Third.
-----------------------------	---	-----------------------

PERMANENT MOLARS.

3 months old	1	Fourth.
9 months old	1	Fifth.
18 months old	1	Sixth.
18 to 24 months old	3	First, Second, Third.

In the sheep, as in the ox, all the temporary incisors are up at one month old, as well as the first, second, and third molars. At one year old the two central incisors are changed and replaced by permanent teeth, and the fourth and fifth molars are up. Six months later the two lateral central and the sixth molar appear. At two years

and three months the lateral permanent incisors are cut, and the first, second, and third molars are permanent. At three years old the corner incisors are shed, and shortly afterwards all the permanent teeth are in the mouth.

FIG.

TEMPORARY INCISORS AND TUSHES.

<i>Period.</i>	<i>Number.</i>	<i>Position.</i>
At birth	2	Tushes.
"	2	Corner Incisors.
1 month old	2	Central.
3 months old	2	Lateral.

PERMANENT INCISORS AND TUSHES.

9 months old	2	Tushes.
12 "months" old	2	Corner Incisors.
18 months old	2	Central.
		Lateral.

TEMPORARY MOLARS.

1 month old	3	First, Second, Third.
-----------------------	---	-----------------------

PERMANENT MOLARS.

6 months old	1	Premolar.
" " " " " " " "	1	Fourth.
9 months old	1	Fifth.
12 months old	3	First, Second, Third.
18 months old	1	Sixth.

The pig acquires a full mouth of incisor teeth at about three months old, some time previous to which three molars have appeared in each jaw—viz., the first, second, and third. At six months the premolars and the fourth permanent molar appear; in nine months the tusks and fifth permanent molar are changed. Three months later the first, second, and third temporary molars are shed and replaced by permanent ones. At eighteen months the sixth or last molar and the lateral incisor are cast, and the changes at this time are complete.

APPENDIX.

RENNET.—The rennet used in the cheese manufacture is made from the dried stomachs of young calves—"vells," so called. In Cheddar cheese making so many vells are allowed to stand in as many quarts of salt water, and the liquid rennet is used after three or four weeks standing, at the rate of half-a-pint to 100 gallons of milk—enough to set the curd in about an hour. In Cheshire cheese making fresh rennet is used—that which is used each morning having been made the day before—about eight or nine square inches of the vell having been put in a pint of salt water and kept in a warm place; and this is enough for 100 gallons of milk. Mr. Siddorns of Broxton, Cheshire, who has taken accurate weight and measure, finds that five pieces of "vell," each weighing sixty grains, standing in twelve ounces of water during the day, in a temperature of 70°, give the proper quantity for 50 gallons of milk. The Irish vell is used, being from very young and wholly milk-fed calves.—The following is the recipe of Mr. Harding of Marksbury, Somerset, a well-known maker of Cheddar cheese: "For making a perfect rennet, mix a brine of strong salt and water sufficient to float an egg *well*; boil half an hour and let it stand till cold. To two gallons add six vells, one lemon sliced, and one ounce of salt-

petre. It will be fit to use in a month, and will keep any length of time."

GESTATION.—The following is the duration of pregnancy in domestic animals :—

Species.	Premature Labour.	Regular Labour.	Protracted Labour.
Mare	330 days	340 days	420 days
Cow	240 "	285 "	330 "
Sheep and Goat	135 "	144 "	160 "
Sow	110 "	120 "	130 "

CASTRATION.—Castration consists in the removal of the testicles from what is termed the scrotal sac or purse.

In different animals different periods of life are selected for its performance. Twelve months old is usually considered a suitable period for the emasculation of horses, but where colts are foaled late and lose the advantage of summer growth, or where there exists any constitutional weakness, or want of development, it may be advisable to defer the operation for six or twelve months. Colts with long, lean, ewe-like necks, and a deficiency of crest, or prone to legginess, and want of spring and depth of ribs, will be benefited by the delay. April and May are the months best suited to the operation ; the weather is then fairly cool, and flies have not yet become troublesome. Clear, dry weather should be selected. Easterly and north-easterly winds are to be avoided.

In order to entail the least possible risk, it is desirable to observe certain precautionary measures before proceeding to the operation. The general health of the subject should be good ; and the operation must be postponed if influenza, strangles, and other like disorders are prevalent in the vicinity of the farm.

Preliminary to the operation the scrotum or purse should be carefully examined, in order to determine whether both testicles have descended into it. If only one is found there, further time should be allowed for the descent of the second, otherwise the operation will require to be repeated. The operation need not be here described in detail. It includes casting the colt in the case of the horse, and in all cases cutting and the removal of the testicles—the cord by which it is suspended being burnt through with a blunt-edged iron at a dull red heat. For twelve hours preceding the operation, food and water should be withheld in order to prevent any internal mischief during casting, or while the operation is proceeding. Where the knife is employed the vessels of the cord must first be strangulated by ligature, or by clams. In young animals, such as sheep, calves, and pigs, where the vessels are small and the tissues soft and easily torn, the cord is simply twisted upon itself once or twice, and then “drawn” out, thus breaking the testicle away from its connections. Whatever method be adopted, the aim and object is alike in all, viz., to prevent hæmorrhage or bleeding.

When the animal has been liberated from the ropes he should be walked quietly to the stable and kept perfectly quiet in a thoroughly clean, roomy, and well ventilated box. His diet should be light and easy of digestion, such as scalded oats, with bran and a few roots.

In from 24 to 48 hours swelling of the sheath and scrotum will take place, when, should no other signs of disorder exist, a little walking exercise may be allowed two or three times during the day. If at any time after the operation profuse bleeding sets in, it may usually be arrested by plugging the purse with tow or cotton wool, and applying cold water to it, and wet cloths over the loins. Calves and pigs are commonly cut between two and four months old, and lambs about the tenth to the sixteenth day after birth. In all cases after the

operation it is advisable to place them on clean litter, and to protect them from wet and cold.

A large number of animals are annually sacrificed by the neglect of these simple precautions.

TASTE OF TURNIPS IN BUTTER.—The correction of this disagreeable consequence of feeding cows on turnips must depend mainly on giving, both naturally and artificially, opportunity for the escape of the aroma. To this end it is well (1) not to feed cows on turnips except immediately after a milking, by which means the cow has twelve hours in which to get rid of the smell of the vegetable; and (2) it has been recommended to keep up the natural heat of the milk in the vessel into which it is poured, either by standing it on a hot surface, or by actually adding hot water to it, and thus giving a chance for the smell to evaporate; (3) it diminishes the risk of communicating the flavour, if the turnips themselves be given as a hot mash (after steaming or boiling) along with chaff of hay and straw; (4) the cream may be heated or kept hot for some time before being churned; (5) an addition of saltpetre (a teaspoonful to every gallon of cream before churning) has been recommended, and even of chloride of lime (a drachm to every expected pound) to the water in which the butter is washed. But it is better to avoid the risk by giving as little of the turnips as possible to cows when in full milk.

STABLE RATIONS.—We take the following examples from a paper by Mr. J. C. Morton, in Volume XIX. of the English Agricultural Society's Journal. They illustrate the variety of farm practice in this particular, and the varying expense thus often unwittingly incurred by different farmers:—

THE SEASONS.	Hay.	Oats.	Beans.	Roots.	Clover.	Pasture.	Weekly cost.
SUMMER SEASON.	lbs.	lbs.	lbs.	lbs.			s. d.
J. Binnie, Seaton	—	70	28	—	<i>ad lib.</i>	night.	11 0
J. Morton, Whitfield	—	70	—	—	7 cwt.	—	8 9
AUTUMN SEASON.							
Professor Low . . .	140	50	—	potatoes	—	—	7 6
W. Yater, Botley . .	160	63	32	—	—	—	12 0
T. P. Dods, Hexham .	<i>ad lib.</i>	105	—	—	—	—	10 6
H.J. Wilson, Mansfield	42	87	—	bran.	—	<i>ad lib.</i>	9 0
WINTER SEASON.							
J. Gibson, Woolmet .	—	84	—	turnips.	potatoes	straw.	
				220	220	112	9 0
J. Morton, Whitfield	—	126	—	—	carrots.	<i>ad lib.</i>	10 9
					330		
W. Yater, Botley . .	—	—	32	70	pollard.	<i>ad lib.</i>	5 6
T. Aitken, Spalding .	<i>ad lib.</i>	38	35	—	—	<i>ad lib.</i>	9 0
J. Cobban, Whitfield	84	60	—	linseed.	—	<i>ad lib.</i>	7 3
				34	—		
M. Sanford, Dover .	56	42	—	carrots.	bran.	<i>ad lib.</i>	5 6
				80	28		
F. Sowerby, Aylesby	—	105	23	—	oilcake.	<i>ad lib.</i>	10 6
					7		
SPRING SEASON.							
D. A. Milward . . .	63	70	—	turnips.	—	63	8 0
				280			
A. S. Ruston, I. of Ely	<i>ad lib.</i>	84	—	grn. rye.	—	—	10 0
				<i>ad lib.</i>			

COST OF HORSE POWER.—This was the subject of a paper in the 19th volume of the Journal of the English Agricultural Society, in which the cost of maintaining and feeding the horses of the farm,—the expense of wages, of harness, blacksmith, and farrier ; the cost of maintaining the horse implements being also added,—was elaborately calculated. And the whole, as stated in a number of ascertained examples, was compared with the actual amount of draught per annum to which all the horse work of the farm, carefully added together, was reduced. The following table, in which the main conclusions in six examples are given, is here quoted ; but the whole paper deserves examination. The

common calculation is that a horse-power is 33,000 lbs. lifted 1 ft. high per minute; and this is nearly in accordance with agricultural experience: *e.g.* a pair of horses will draw a plough at the rate of $2\frac{1}{2}$ miles an hour, *i.e.* 220 ft. a minute; and that, at $2\frac{1}{2}$ cwt. of draught, corresponds to a draught (= a lift) of 30,800 lbs. apiece one foot per minute; an amount often exceeded during greater draughts and quicker speeds. From a half to two-thirds of this amount is actually realised during any prolonged period of agricultural work—the smaller amount being easily understood when you take the periods of comparative rest into account, as when turning at plough upon the land ends, or, when at cart, waiting while being loaded. The following is the table referred to, from which it will be seen that agricultural horse power costs about 6*d.* per cwt. of draught (= lift) per hour of $2\frac{1}{2}$ miles.

Name and number of Horses worked.	Performance per Horse, <i>i.e.</i> lbs. lifted 1 Foot per Minute.	Annual Labour.		Cost of Horse Labour.		Cost of Horse-power per cwt. drawn $2\frac{1}{2}$ miles.
		Cwts. drawn 1 Mile per Annum.	Cwts. drawn $2\frac{1}{2}$ Miles per Hour.	Per Annum.	Per Hour.	
	lbs.	cwts.	cwts.	£ s.	s. d.	d.
Aitken (20) . .	13,250	100,000	14·8	873 0	6 5½	5½
Coleman (11) . .	14,354	44,000	6·5	471 5	3 6	6½
Laidlaw (7) . .	16,052	30,800	4·5	346 12	2 6½	6½
Wilson (20) . .	11,957	93,800	13·88	981 16	7 3½	6½
Melvin (20) . .	19,693	107,900	15·98	1131 10	8 4½	6
Morton (7) . .	16,492	37,106	5·5	381 10	2 10	6

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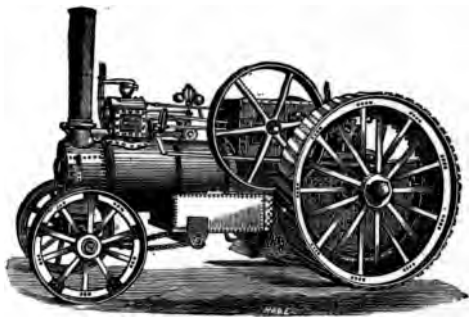


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